THE PERCEPTION OF FACIAL ATTRACTIVENESS

A cross-cultural study

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A thesis submitted in partial
fulfilment of the requirements of the degree of

MASTER OF ARTS IN PSYCHOLOGY

University of Canterbury
1991

" 'It's unfortunate, if I happen to look like what pleased some soppy old Greek sculptor, but I assure you that if it weren't for my face I'd be a quiet nun in the convent without' - then she broke into a run and her raised voice floated back to him as he followed - 'my precious babies, which I must go back and see.' "

F Scott Fitzgerald (1920). *This side of paradise,* p 418.

ACKNOWLEDGEMENTS

I would like to thank: Jim Pollard for all his invaluable help; Simon Kemp for consolidating my statistical ignorance; Professor Oba for collating my Japanese data; Kirsten McIvor and Grant Barrie for their translation work; and last but not least, Denise van Sprang for putting up with me and two years of thesis writing.

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ABSTRACT

Building on previous research on facial attractiveness, this thesis tested the evolutionary theory that a universal standard of facial attractiveness, based on indicators of health and fertility in females and indicators of status and maturity in males, exists. By correlating attractiveness ratings from Japanese and New Zealand university students with feature measurements of male and female faces from these cultures, as well as correlating the attractiveness ratings between the two cultures, it was found that both similarities and differences in the attractiveness of facial features exist. Whilst female features of large eyes and thick lower lips were found to be predictors of attractiveness for subjects from both cultures, no such features were found for male faces. However, culturally specific preferences for several male and female facial features which were predicted by evolutionary theory to be attractive, were found. It was concluded that standards of female facial attractiveness may be less affected by cultural influences than standards of male facial attractiveness. Suggestions were made for future research to determine more clearly which facial features are universally attractive, which features vary in attractiveness value across cultures, and why these cultural differences exist.

INTRODUCTION

This thesis attempts to explain facial attractiveness in the context of evolutionary theory. Basically, it will be argued that a female face will be rated as attractive if its features indicate health, fertility and reproductive age, whereas a male face will be rated as attractive if its features indicate maturity or dominance and the ability to provide for offspring. It will further be argued that these standards of attractiveness should be largely genetically determined and therefore should be be fairly consistent across all cultures.

The following literature review concentrates largely on facial attractiveness. Obviously, the whole human body can be studied in terms of attractiveness, however nearly all research on human attractiveness has concentrated on facial attractiveness. Alley and Hildebrandt (1986) report that there is in fact a high correlation between the attractiveness of people's faces and the attractiveness of their whole bodies and that ".... in most cases facial appearance is probably the most important factor contributing to overall attractiveness." (p 102). Therefore the concentration on facial attractiveness appears to be justified.

1. The importance of physical attractiveness in people's lives

> "To be born beautiful is a bonus and it is crazy not to make the most of it" (Sir Robert Jones, Christchurch Star, 2 July 1990).

Physical attractiveness has been studied extensively for the past twenty years. Each major review of the literature (eg Alley and Hildebrandt, 1986; Berscheid and Walster, 1974; Shepherd, 1989; Sorell and Novak, 1981) leads one to conclude that the "Beauty is good" stereotype is a remarkably robust one.

> "Not only are physically attractive persons assumed to possess more socially desirable personalities than those of lesser attractiveness, but it is presumed that the beautiful attract the World's material benefits and happiness as well." (Berscheid and Walster, 1974, p 171).

Recent research has shown that attractive people indeed tend to get a better

deal out of life than unattractive people, right from birth to adult age:

> ".... an ugly baby is a very nasty object." (Queen Victoria, 1859; in Langlois, 1986, p 23).

Langlois (1986) cites evidence that right from birth, attractive children are treated differently by unrelated people such as teachers and by related people, including their own mothers. McCabe (1984; 1986) showed that children with larger "cranium-to-face proportions" which probably means they looked younger and therefore cuter (Hildebrandt and Fitzgerald, 1979; Horvarth et al, 1987; Sternglanz et al, 1977), tend to receive more nurturance, less discipline and are less likely to be maltreated than children with smaller "cranium-to-face proportions" (ie looked older and less attractive). As could be expected if attractive and unattractive children are socialized differently, attractive and unattractive children behave differently as well (Langlois, 1986).

At a later age, attractive male college students have been shown to be more socially competent while attractive female college students were shown to be more satisfied than unattractive college students (Reis et al, 1980; Reis et al, 1982).

Furthermore, attractive females are more likely to marry a well educated and wealthy husband and the least attractive females are ten times as likely never to have married than attractive females (Udry, 1978).

The common assertion that beauty is only skin deep and loses its importance when people have got to know each other better is not necessarily true. White (1980) demonstrated that partners in heterosexual relationships were likely to be less committed to their relationship and were more likely to break up if they differed significantly in attractiveness. Margolin and White (1987) also showed that the quality of marital sexuality was negatively affected with the decline of partners' attractiveness, especially the female partner's attractiveness.

Finally, physical attractiveness appears to enhance general achievement and even mental health (Umberson and Hughes, 1987). It is positively correlated with intelligence (Maruyama and Miller, 1981; Richardson et al, 1985; both cited in Alley and Hildebrandt, 1986). Cavior (1970; in Berscheid and Walster, 1974) goes so far as to say that psychotherapists may be better off using plastic surgery to alleviate their patients' problems with depression than through months or years of therapy. People's obsession with living up to society's standard of beauty can also lead to

mental as well as physical illness by "overadaptation" (Mazur, 1986). Mazur describes how this overadaptation by women led to general bad health in Nineteenth Century Britain, hysteria in the early Twentieth Century, bossom anxiety in the 1950s and 1960s and anorexia nervosa and bolemia today.

There are numerous other examples of how important physical attractiveness is in people's lives (eg the widespread use of cosmetics to enhance attractiveness). In short, in Western society (where most of the research has been done) at least, it cannot be denied that physical attractiveness plays an important role in most people's lives, whether they are aware of it or not. This is an especially interesting, if not disturbing conclusion, since attractiveness is largely determined at birth and is mostly beyond our control. The questions which must therefore be answered are: What is physical attractiveness in the first place, and why is physical attractiveness so important?

2. Physical attractiveness in the context of evolutionary theory

The most plausible explanation for the importance of physical attractiveness appears to come from evolution-based theories such as sociobiology (Buss, 1986, 1988,1989; Cunningham, 1981, 1986; Symons, 1987; Trivers, 1972), ethology (Eibl Eibesfeldt, 1970; Guthrie, 1976; Lorenz, 1947) and ecology (Berry and McArthur, 1986; McArthur and Baron, 1988; McArthur, 1988). Basically, evolutionary theory states that it has been adaptive in our evolutionary past to be attractive and to be able to recognize attractiveness in a member of the opposite gender as well as a member of the same gender.

A fundamental assumption for sociobiology is that animals, including humans, are genetically programmed to maximize their genetic fitness by leaving as many healthy offspring who will be able to repeat this task as possible (Wilson, 1975). In order for an individual to achieve this goal it is essential to find mates who are: a) fertile, free of disease and able to produce strong, healthy offspring; and b) able to look after and provide for the offspring. Thus it may be that attractiveness in humans functions as a signal for these qualities in potential mates. As McArthur (1988) states:

"Ethologists and evolutionary biologists have proposed that attractiveness may be

> related to reproductive fitness (eg Guthrie, 1976). If so, then people should be perceived as attractive to the extent that their vocal, facial and bodily characteristics reveal them to be of reproductive age, healthy, prototypical of their gender, and receptive. Most of these indicators of reproductive fitness should be universal. Moreover, culturally specific norms of attractiveness may derive from their indication of reproductive fitness in that culture, rather than reflecting an arbitrary array of characteristics." (p 257).

So for the evolutionary hypothesis to be true, there should be high overall agreement on what attractiveness is, since this perception is likely to be innate.

Gender differences in physical attractiveness can also be expected. What is seen to be attractive in females may not be attractive in males, and vice versa. According to sociobiological theory, there is a distinct sex difference in parental investment for humans:

> "A copulation that requires minimal male investment can produce a 9-month investment by the female that is substantial in terms of time, energy, resources, and foreclosed alternatives." (Buss, 1989, p 1).

Buss (1989) suggests that in return for only having to make such a small investment, males:

> ".... may provide mates with food, find or defend terretories, defend the female against aggressors, and feed and protect the young. Human males may also provide opportunities for learning, they may transfer status, power, or resources, and they may aid their offspring in forming reciprocal alliances. These forms of male investment, when provided, tend to decrease the investment disparities between males and females." (p 2).

Buss and others (eg Symons, 1987) also suggest that male fertility is not as closely linked with age as female fertility, so that it may not be as clearly visible from appearance. Therefore, physical appearance in males may be more a signal of status than of fertility and youth. Because males may attain increasing status as they get older, they may still be seen as attractive at an older age, compared to females. Male attractiveness may not be as important a factor as female attractiveness in mate selection (Buss, 1989), because it is less reliable as an indicator of fertility and because male parental investment is not predicted by it, females would have to look at many other characteristics as well, such as a proven ability to care and provide for them and their offspring.

Evolutionary theory may also provide the answers to questions raised by research of a more sociological nature, such as that of Kalick (1988) who saw the need to "address some quite deep questions" including "why is attractiveness linked to status differences?" (p 488). This research has used a "marketplace" theory to explain physical attractiveness phenomena (eg Kalick, 1988; Margolin and White, 1987; Umberson and Hughes, 1987; Webster and Driskell, 1983; White, 1980), based on the theory that people, especially females, use beauty as a status symbol to move up socially and economically (eg Udry, 1978; Udry and Ekland, 1989). The underlying reason for this effect would then be that men of high status who have more power to choose, choose an attractive female as partner because her attractiveness indicates that she is able to bear healthy offspring. Vice versa, attractive females also have more power to choose, and therefore choose a male partner who has the resources to invest in her and her offspring, ie someone with status.

There are at least three ways in which the outlined evolutionary theory of attractiveness can be empirically tested. Firstly, the hypothesis that the perception of attractiveness is genetically determined can be tested by showing that young children or infants discrimate between faces on the basis of attractiveness. Secondly, if the perception of attractiveness is genetically determined, then cross-cultural research should provide evidence of a universal standard of attractiveness. Thirdly, it must be proven that facial features which are predicted by evolutionary theory to be indicators of biologically advantageous attributes are indeed seen as attractive by most people.

The existing evidence for these three propositions will be discussed in turn.

3. Is the perception of attractiveness innate?

Recent studies have shown that infants as young as three months old tend to spend more time looking at attractive female faces than unattractive female faces, as judged by adults (Langlois, Roggman, Casey, Ritter, Rieserdonner and Jenkins, 1987; Samuels and Ewy, 1985), indicating that they recognize attractiveness in a face. Langlois et al (1987) point out that none of the stimulus faces used in their study was either extremely attractive or extremely unattractive, making the result all the more significant.

They offer two explanations for the result. The first explanation is that the

effect is ".... an incidental consequence of the sensitivity of the human visual system to certain physical aspects of visual stimuli" (p 367). In other words, perhaps attractive faces contain the high contrast contours, curves, concentricity, vertical symmetry and "good" figural form which previous research (eg Fantz, 1961) has shown infants to prefer. This however does not explain why infants prefer these forms in the first place.

The second explanation is that infants prefer the features of an attractive face because they are more representative of a prototypic face and therefore portray more positive social information. So this explanation reverses the first by saying that infants prefer the forms described above because of the social significance they have in a human face.

Samuels and Ewy (1985) were very reluctant to admit to a genetic basis for attractiveness perception and therefore understandably felt puzzled by their results. Langlois et al (1987), on the other hand argue strongly, on the basis of their results, that the ability to perceive attractiveness must be innate:

> "The results thus call for a radical reorientation of thinking about the origins of physical attractiveness preferences and stereotypes" (p 367), and:
> ".... these findings suggest that the rudimentary beginnings of preferences for attractiveness may be present in infancy and that a universal standard of attractiveness, overlaid with cultural and temporal variation may exist." (p 367).

Since only caucasian female faces and caucasian infants were used in these studies, the findings need replications using stimulus faces and subjects from different cultures in order to provide further support for the existence of a universal standard of attractiveness.

Another interesting research question is whether attractive male faces are also preferred by infants, as it appears likely that attractiveness is sexually dimorphic (Cunningham et al, Unpublished; Nakdimen, 1984) and an attractive male face may portray different social information than an attractive female face, as will be discussed later.

4. Is there a universal standard of attractiveness?

Traditionally, researchers have doubted the possibility of a universal standard of attractiveness, focussing their attention on the great cultural differences in preference for body shape, dress and ornamentation (eg Berscheid and Walster, 1974; Darwin, 1871; Ford and Beach, 1951; Hatfield and Sprecher, 1986; Liggett, 1974). Darwin concluded that attractiveness did not have a standard across the human species but rather depended on local differences in adaptation.

Even so, McArthur (1988) reports that there are certain characteristics of attractive humans which are quite consistent across cultures, such as health, feminine plumpness and cleanliness (Ford and Beach, 1951) and female bodies with large breasts and hour-glass figures (Gitter, Lombranz, Saxe and Bar-Tal, 1983).

When it comes to facial attractiveness, the very different, sometimes extreme types of ornamentation, decoration and even mutulation of the face across cultures (Liggett, 1974) may be more important as indicators of things other than attractiveness, such as status, achievement, group membership, and religious or superstitious beliefs (Alley and Hildebrandt, 1986). Thus, there may still be a certain facial form which is judged to be attractive by members of most cultures.

Certainly within cultures, there appears to be very high agreement between subjects when rating male or female faces on attractiveness, with reported correlations usually around .9 and whether the subjects are of different genders or ages does not appear to make much difference (Cross and Cross, 1971; Iliffe, 1960; Kerr and Kurtz, 1978; Langlois and Roggman, 1990; Morse et al, 1974, 1976; Pollard, Unpublished; Reis, Nezlek and Wheeler, 1981).

However, it must be noted that individual differences in preferences do create some variability in attractiveness ratings. Cross and Cross (1971) found that even the faces which were rated least attractive overall were rated as most attractive by at least one of their subjects. It would be interesting to determine what makes these few individuals' perceptions so different. It could be for example, that they are very unattractive themselves and that their judgment is based on the acceptance that people who are similar in attractiveness as well as other characteristics tend to pair-bond (Berscheid and Walster, 1974; Symons, 1987).

It should also be noted that people do not appear to be very reliable judges of their own attractiveness (Downs and Wright, 1982).

There is some evidence for cross-cultural agreement over facial attractiveness.

The most useful data come from studies which have correlated attractiveness ratings of different cultures. All these studies have found highly significant correlations, but the size of the correlations vary substantially. Madden and Hollingworth (1932, reported in Shepherd, 1989) found a relatively low correlation of .47 between caucasian and Chinese subjects when rating caucasian faces. McArthur and Berry (1987) also found a correlation of .47 between caucasian and Korean subjects rating caucasian faces, although when rating schematic faces they found a correlation of .95. Shepherd and Deregowski (Reported in Shepherd, 1989) found a correlation of .66 between caucasian and African subjects using caucasian female faces. Thakerar and Iwawaki (1979) found considerably more agreement over the attractiveness of Greek male faces, reporting a correlation of .89 between English and Eastern subjects. Pollard (Unpublished) found correlations ranging from .306 to .712 between subjects from four different cultures rating caucasian male and female faces.

Other cross-cultural studies have used different methods to determine the extent of cross-cultural agreement or differences. For example, Maret (1983) and Cross and Cross (1971) compared mean ratings for groups of faces from different cultures. Whilst these types of data may indicate differences in the level of attractiveness ratings for a particular stimulus set, they do not say anything about the agreement or disagreement over the order of attractiveness of individual faces. For example, Cross and Cross (1971) found that white male subjects consistently give lower ratings to female faces than black subjects do. However, if a correlational analysis had been used, they may well have found that both subject groups did show high agreement on which particular faces in the stimulus set were more attractive and which were less attractive. If this were the case, subjects from both cultures would still be discriminating on the same criteria of attractiveness.

One thing these studies have shown is that female faces consistently receive higher ratings than male faces, indicating that attractiveness is more important for females than for males (Bernstein, 1982; Cross and Cross, 1971; Maret, 1983). Maret (1983) found that Cruzan and American subjects rated female faces as more attractive than male faces and suggested that this gender effect "....perhaps is attributable to subjects' greater cognitive association of females with the concept of attractiveness: Whereas males are primarily valued in terms of power, wealth, prestige and position, females may still often be measured in terms of attractiveness" (p 115). This conclusion is backed up by Buss and associates (1986, 1989, 1990) who found that physical attractiveness, which he argues is an indicator of reproductive potential in

females, was valued more in females in mate selection, whereas earning potential (ie the ability to provide resources) was valued more in male potential mates. This implies that whereas attractiveness in a female is desirable in itself, attractiveness in a male needs to be backed up by actual behaviour to prove mate potential. As a result of greater sexual selection for facial attractiveness in females, females may in fact have more attractive faces on average than males (Alley and Hildebrandt, 1986).

Rather than using actual faces, Wagatsuma and Kleinke (1979) asked subjects from different cultures what types of facial features they preferred and found considerable cross-cultural differences in these preferences. However, as Shepherd (1989) points out, this type of result is not necessarily valid because the cues which subjects *say* they use in judging attractiveness are not neccessarily the cues they actually use when asked to rate an actual face's attractiveness.

In any case, the correlational studies to date indicate that between all cultures studied, there is at least moderately strong agreement on the facial attractiveness of caucasian faces, lending support to the hypothesis that there is a universal standard of attractiveness. However, the methodology of the existing cross-cultural studies have not been very systematic (McArthur, 1988) and their validity may in some cases be questionable. For example, Thakerar and Iwawaki (1979) only used ten stimulus photographs and several studies used as few as ten subjects from each culture to rate the faces.

The fact that intra-cultural correlations have consistently been found to be higher than cross-cultural correlations shows that cultural factors certainly play a part in the judgment of attractiveness, but the research to date does not give much insight as to what these cultural differences consist of and why they exist. Conversely: "It remains to be seen to what degree universal standards for facial attractiveness exist." (Alley and Hildebrandt, 1986, p 138).

Obviously, more systematic correlational cross-cultural research is needed. Future studies should include a substantial number of faces to be evaluated to ensure that those facial features which represent a universal standard are actually present. These studies should also include stimulus faces from cultures which are not caucasian. It may be for example, that there is more cross-cultural agreement over the attractiveness of caucasian faces because of their more prominent exposure in the media. In order to determine what the cross-cultural differences are, this research should be combined with correlations between ratings and measurements of facial features.

5. What features make a face attractive?

Having established that it is likely that there are certain aspects of a face which are seen as attractive by most cultures, it remains to be determined what these features are. Recent research guided by evolutionary theory has gone some way to identify these features. The method used in this research has consisted of obtaining subjects' attractiveness ratings of either drawings or photographs of faces and correlating these ratings with measurements of certain features in these faces.

Infant attractiveness

Initial research of this kind was inspired by the writings of ethologists like Lorenz (1943) and Eibl Eibesfelt (1970) who observed that in many species of animals infants appeared to possess distinct features such as larger foreheads, larger eyes, smaller noses and mouths, fatter cheeks and generally rounder features, softer skin and lighter colour, compared to adults. They suggested that these features as well as typical infant behaviour patterns have the function of eliciting care-taking responses and inhibiting aggression by adults. Thus it follows that the more pronounced these features are, the more adaptive it is for the infant and that these features should be seen as more attractive or "cute" by adults.

Sternglanz, Gray and Murakami (1977) put this hypothesis to the test by varying sizes and placements of features in line drawings of infant faces. They found that the most attractive face had large eyes, large pupils and a large forehead, as predicted. Most of the relationships between feature sizes and attractiveness ratings were curvilinear, which means that either extremely small or extremely large features were seen as less attractive. This finding is in line with recent research which has suggested that attractiveness in faces is enhanced by "averaging" their features (Langlois and Roggman, 1990; Pollard, cited in Shepherd, 1989, p 308; Symons, 1987). However, it may be that this finding is due to the variation in feature sizes in the line drawings being larger than they would be in real infant faces. Thus relationships of a more linear nature may be found when actual photographs of infant faces are used.

Horvath, Szmigelsky and Fenton (1987) also found that eye size was clearly related to attractiveness ratings of drawings of children ranging in age from two weeks old to four years old. Further empirical support comes from studies using photographs of real faces by Hildebrandt and Fitzgerald (1978; 1979) who found that

cute infants were more likely to have larger eyes, larger foreheads, larger cheeks, narrower noses, shorter ears and smaller mouths.

As discussed earlier, children who possess these pronounced babyish features and who are therefore likely to be more attractive are more likely to receive better caretaking behaviour from adults than unattractive children who do not possess these features (McCabe, 1984; 1986), so the argument that being attractive is biologically adaptive appears to be valid for young children at least.

Adult attractiveness

On their discussion of research on infant primates, Sternglanz et al (1977) state:

> "The available field literature seems to indicate that the ending of intensive mothering and social immunity are determined by the disappearance of the infantile physical characteristics rather than by the choice of the infants. The infants protest considerably when their protected status ends." (p 108).

Therefore, if there is a similar effect in humans, it may be biologically advantageous for humans to keep at least some of the infantile features, even at an adult age. This is part of the reasoning behind recent research on attractive features in human adult faces. The other reason for the predicted importance of babyish features in attractive faces, in females at least, is that they indicate youth and therefore fertility (Cunningham, 1986; McArthur, 1988; Symons, 1987).

However, infantile features are unlikely to be the only indicators of adult attractiveness. If facial attractiveness indicates fertility in females, then presumably an attractive female face should also show some signs of maturity or an indication of being at an optimal age for reproduction (Cunningham, 1986).

As discussed earlier, gender differences in adult attractiveness are predicted by evolutionary theory. Because male fertility is not as bound to age as female fertility is, indicators of youth may not be as important for male attractiveness as indicators of status or dominance (Guthrie, 1976). There is evidence that the gradual decline in attractiveness goes parallel with the decline in fertility, with the result that female attractiveness declines more sharply with age than male attractiveness (Deutsch, Zalenski and Clark, 1986). Also, the fact that the age-gap between male and female partners tends to increase with the age of the male partner (eg Margolin and White, 1987) shows that a man's aquired status may be a more important determinant of a

woman's mate choice than his youth, whilst the reverse is true for a man's mate choice. Accordingly, Sadalla, Kenrick and Vershure (1987) found that males who portrayed dominant behaviour which presumably portrays high status (Guthrie, 1976) were judged as more attractive, while this type of behaviour had no effect on perceived female attractiveness.

Working from these findings, it can be predicted that female facial attractiveness may be determined predominantly by features which indicate youth and fertility and which perhaps elicit care-taking responses from males. Male facial attractiveness may also be determined by these features to an extent, but features which indicate dominance, status and the ability to provide this care-taking behaviour are expected to be more important.

To determine which facial features were indicators of babyfacedness in adult faces, Berry and McArthur (1985) asked subjects to rate faces on how babyish they looked and then correlated these ratings to feature measurements of these faces. They found similar results to the infant studies. Larger eyes, rounder eyes, narrower chins and higher eyebrows were represented in more babyish faces. From this it can be assumed that small eyes, wide chins and low eyebrows are signs of facial maturity. Guthrie (1976) further speculated that features like square jaws, bushy eyebrows, thin lips and prominent cheekbones were indicators of dominance.

Two studies which have used the manipulation of some of these features in schematic faces have found some evidence for the proposed sexually dimorphic difference in attractiveness. McArthur and Apatow (1983-84) found that eye size in both male and female faces was positively correlated with attractiveness, but this correlation was stronger for female faces than for male faces. Keating (1985) found that eye size was significantly correlated with attractiveness in female faces, but not in male faces. She also found that the mature features of thin lips and square jaws were judged to be attractive in male faces, but not in female faces. It must be noted however that the faces used in these studies were not real and therefore these results may not be representative for attractiveness in real faces.

The most comprehensive studies designed to determine what features are attractive in female and male faces have been conducted by Cunningham (1986) and Cunningham, Barbee and Pike (Unpublished).

Cunningham (1986) found that female attractiveness was not only related to babyish features, but also to features which indicate maturity and positive expression. He asked caucasian male subjects to rate facial photographs of female

college students as well as beauty contestants from a variety of cultures and found significant correlations between attractiveness ratings and: the neonate (or babyish) features of higher eyes, wider eyes, more widely seperated eyes, smaller noses and shorter chins; the mature features of wider cheekbones and narrower cheeks; and the expressive features of higher eyebrows, wider pupils and wider smiles. Narrow cheeks were considered to be a mature feature because they indicate that the face has lost its "baby fat". High eyebrows, wide pupils and wide smiles were expected to be attractive because they indicate the expression of positive affect which has been found to increase attractiveness ratings for female faces (eg Mueser, Grau, Sussman and Rosen, 1984). Raised eyebrows may also be a sign of submissiveness (Nakdimen, 1984), which may be attractive to males.

In a second study, Cunningham (1986) also found high correlations between most of these features and very high correlations between attractiveness ratings and subjects' ratings of apparent health and fertility, as well as being preferred for a date, sex and raising children. These findings thus lend further support to the evolutionary theory of female attractiveness.

In an as yet unpublished study, Cunningham, Barbee and Pike applied the same methodology to determine what facial characteristics are perceived as attractive in photographs of male faces. Just as with the female faces in the Cunningham (1986) study, they found significant correlations between female subjects' attractiveness ratings and: the neonate features of higher eyes, wider eyes and smaller noses; the mature feature of prominent cheekbones and the expressive feature of a wider smile. However, in contrast to babyish small chins being attractive in female faces, they found that larger chins which presumably portray dominance were attractive in male faces. Attractiveness ratings were also correlated with higher status clothing being worn by the stimulus persons. Eyebrow height was found to have no relation to attractiveness, indicating that the portrayal of submissiveness by male faces is not attractive.

As predicted, these findings show that while babyish features are present in both male and female faces, features portraying maturity and dominance are more influential in determining the attractiveness of male faces than female faces. Further support for the theory that male attractiveness is more an indicator of status and the ability to provide for spouse and offspring is given by the finding by Cunningham et al of high correlations between attractiveness ratings and ratings of dominance, brightness and likelihood of ending up rich.

Cunningham et al came to the conclusion that females use "multiple motives" when judging male facial attractiveness. Thus, females are attracted to males who have strong mature features such as a large chin and prominent cheekbones, but on the other hand, they do not want a male who is so dominant that he appears unapproachable and unwilling to participate in nurturing behaviours. Therefore, some babyish features such as large eyes and small noses and expressive large smiles enhance the perceived attractiveness of a male face.

According to Cunningham (1986) a different set of multiple motives operate in males when judging female facial attractiveness. He argued that the presence of some mature features in an attractive female face balanced the preference for babyish features which ensured that pedophilia was avoided and ".... advances were only made to postpubescent females" (p 926). Of course it may also be that males simply prefer a female who has high status as well as reproductive value.

The Central Tendency Hypothesis

> "The judges certainly had a difficult task in this particular contest since nearly all the girls looked identical" (A K Grant on the *Revlon Face of the Eighties* beauty contest; Christchurch Press, 15 November 1988).

Apart from neonate, mature and expressive features, there are likely to be other facial characteristics which contribute to a face's attractiveness, an obvious example being the appearance of clean, clear and smooth skin (Alley and Hildebrandt, 1986).

A different approach to defining facial attractiveness, using a combination of evolutionary theory and developmental and cognitive theories of information processing, has suggested that "average" or prototypical faces may be most attractive. Langlois and Roggman (1990) noted that developmental and cognitive research has shown that children and adults recognize a form as being representative of a category when that form has been created by averaging a number of other forms belonging to that category (ie a prototype). Berry and McArthur (1986) and Nakdimen (1984) argued that the features which make a face attractive are those features which make them especially representative of either the female or the male gender. In other words, an attractive face may be a prototype of its gender. Langlois and Roggman (1990) further claimed that infants prefer to look at prototypes and

that this explains why Langlois et al (1987) found that infants spent more time looking at attractive faces than unattractive faces.

Langlois and Roggman (1990), as well as Symons (1987) further claimed that prototypical or averaged faces may also be seen as more attractive for evolutionary reasons. Natural selection operates against extremes in the population and therefore it is more adaptive to represent the mean in a population. Thus Symons (1987) suggested the "central tendency hypothesis" which states that people whose feature sizes are closest to the mean size in the population are most attractive because they are likely to be the fittest, biologically speaking.

Ocer a century ago, Galton (1883) discovered that when he superimposed photographs of faces to create a composite face, the composite face was nearly always more attractive than any of the faces it was constructed from. Langlois and Roggman (1990) used a more sophisticated technique of creating facial composites by digitising photographs of a group of faces and mathematically averaging their features. They found that the composite face was most often rated as more attractive than its component faces and that this effect strengthened when more faces were added to the composite.

Extending this research cross-culturally, Pollard (Cited in Shepherd, 1989; p 308) found that female caucasian composites were rated most attractive significantly more often than each of their components by subjects from New Zealand, China, India and Nigeria. This effect was less strong for male caucasian faces, as subjects from some cultures did not significantly rate the composite more attractive. Perhaps for these cultures a male composite representing their own culture would be rated as most attractive. This would mean that the standard for male attractiveness varies more across cultures than the standard for female attractiveness. Because it has been argued that attractiveness in males is not as important as female attractiveness for biological reasons, it would be expected that male attractiveness is more susceptible to cultural influences.

The view that attractive faces are prototypical for their gender is further backed up by Light, Hollander and Kayra-Stuart (1981) who found that attractive faces were more typical of the population and consequently harder to remember. However, this does not necessarily mean that an attractive face is more typical because its features are average. Cunningham et al (Unpublished) found only one male feature (nose length) which was more predictive of attractiveness in its quadratic term than its linear term. For all other features linear relations were more predictive (eg the

larger the chin, the more attractive). So it may be that attractive faces happen to possess all or most of the features which Cunningham (1986) and Cunningham et al (Unpublished) found to be attractive, whilst less attractive faces only possess a few or none of these features, resulting in attractive faces being more similar or typical than unattractive faces.

RATIONALE FOR PRESENT RESEARCH

The preceding literature review reveals that there is considerable evidence to suggest that facial attractiveness has biological determinants shaped by evolution, although cultural determinants also appear to play an important part.

However, several weaknesses in the research to date have been found. Cross-cultural studies on facial attractiveness have not been very systematic, probably because they were not guided by a specific theoretical framework, such as the evolutionary framework proposed here. Only a handful of these studies have reported correlational data which would provide evidence for a universal standard of attractiveness.

In these studies, objective measures of facial features were not made so it cannot be determined which facial features were found to be attractive across cultures and which features' attraciveness were culturally specific. The closest research to date has come to identify facial features which are universally perceived as attractive, was the study by Cunningham (1986) who included beauty pageant contestants from different cultures in his sample. Although he found that the features of these faces varied in the same direction as those of the attractive caucasian faces in the sample, he pointed out that these beauty contestants may have been chosen to represent their country on the basis of a Western standard of attractiveness rather than their own culture's standard. More cross-cultural research using Cunningham's (1986) is needed to determine which features are universally attractive.

Furthermore, because cross-cultural research has tended to use mainly caucasian faces to be judged on attractiveness, it is currently impossible to say whether cross-cultural attractiveness ratings for faces from other cultures which have not had as much media exposure will correlate as highly as they do for caucasian faces. Therefore, cross-cultural research using faces from other cultures appears warranted.

The question of whether the "multiple motive hypothesis" or the "central tendency hypothesis" is most representative of facial attractiveness also warrants further investigation. Whilst Cunningham et al (Unpublished) found little evidence for curvilinear relationships between feature sizes and attractiveness in male faces, no such analyses have been conducted for female faces.

A recent review came to the following conclusion regarding attractiveness

research:

> "Additional research to ascertain what facial, vocal and bodily characteristics are perceived as attractive across cultures certainly seems warranted. So does research that seeks to find cultural differences in definitions of beauty that can be predicted from cultural variations in the adaptive value of the features and/or from cultural variations in perceptual experience. In systematically investigating the contribution of culture to perceived attractiveness rather than merely asserting it, researchers will be able to shed new light on the question of what features are attractive within a given culture and why they are attractive" (McArthur, 1988, p 259).

The present study, while ignoring vocal and bodily characteristics, aimed to go some way in satisfying the research need on facial attractiveness. This was achieved by extending the methodology used by Cunningham (1986) and Cunningham et al (Unpublished) to include both stimulus faces and subjects from two different cultures: New Zealand and Japan.

Hypotheses

Based on the predictions made by evolutionary theory regarding facial attractiveness and the findings reported in the literature review above, the following predictions were made:

1) Female faces are expected to receive higher mean ratings than male faces.

2) High agreement between attractiveness ratings by male and female subjects within a culture is expected.

3) High cross-cultural agreement over the attractiveness of male and female faces from both cultures is expected, although between cultural correlations are expected to be lower than within cultural correlations.

4) Cross-cultural agreement over the attractiveness of female faces is expected to be higher than cross-cultural agreement over the attractiveness of male faces.

5) Most correlations between attractiveness ratings and feature sizes are expected to be linear, although for some features there may be a curvilinear relationship favouring the mean (As found by Cunningham et al, Unpublished).

6 a) Neonate features (large eyes, widely seperated eyes, small noses and small

chins), mature features (wide cheekbones and narrow cheeks) and expressive or submissive features (high eyebrows and wide mouth) in female faces from both cultures are expected to be significantly correlated with attractiveness ratings.

6 b) Neonate features (large eyes and small noses), mature features (wide cheekbones, large chins and thin lips) and the expressive feature of a wide mouth in male faces are expected to be significantly correlated with attractiveness ratings.

Some cross-cultural differences in assigning importance to certain facial features may be found due to cultural differences in adaptation. As no research exists to suggest what these differences might be, no specific predictions are made.

METHOD

1. Subjects

New Zealand subjects

The New Zealand sample consisted of fifty male and fifty female caucasians enrolled in a second year psychology course at the University of Canterbury. All were born in New Zealand. The females' ages ranged from 19 to 21 years and had a mean of 19.44 years. The males' ages ranged from 18 to 27 years and had a mean of 20.5 years.

Japanese subjects

The Japanese sample consisted of fifty male and fifty female students enrolled at Okayama University in Japan. The females' ages ranged from 18 to 22 years and had a mean of 19.26 years. The males' ages ranged from 18 to 24 and had a mean of 19.24.

2. Stimulus materials for New Zealand subjects

Stimulus faces

Eighty stimulus faces were used. These were digitised images of black and white photographs taken of 20 New Zealand caucasian males, 20 New Zealand caucasian females, 20 Japanese males and 20 Japanese females. The people posing for these full-face photographs were students attending the same psychology courses between 1983 in New Zealand and 1986 in Japan. They were also in their late teens and early twenties.

The faces were selected under the criteria that they had non-smiling, neutral expressions and were free of facial hair, glasses and unusual features such as facial disfigurements.

Digitising the faces was done using an Apple Macintosh Plus computer, a *MacVision Unit,* a video camera and the *MacVision* software package. The images were then saved into a *Superpaint* application. This enabled the removal of all background, jewelry and features such as warts or scratches from each face, so that only a black and white face on a white background remained.

The resulting 80 stimulus faces were printed on A4 size pages, together with the 9-point rating scales.

Rationale for the 9-point rating scale

The 9-point rating scale was an integration of formats used in several other studies. Cunningham (1986) used 6 numbered boxes in which subjects placed the photographs. These boxes were catogorised as ranging from extremely attractive to extremely unattractive. In his latest study, Cunningham et al (Unpublished) used an 8-point rating scale ranging from extremely attractive to extremely unattractive. Horvath, Szmigelsky and Fenton (1987) used a 7-point scale with the meanings "7 = extremely attractive, 6 = very attractive, 5 = moderately attractive, 4 = neutral, neither attractive nor unattractive, 3 = moderately unattractive, 2 = very unattractive and 1 = extremely unattractive." Wedell, Parducci and Geiselman (1987) found that scales with more points on it (ie 10 or 101 compared to 5) were more resistant to "successive contrast" and "simultaneous assimilation" effects, where a face is rated either more favourably or unfavourably because of the attractiveness level of the previous face. Thus, it was decided that the 9-point scale presented in figure 1 would be most suitable in this study.

Figure 1. The 9-point rating scale.

9 Extremely attractive
8 Very attractive
7 Moderately attractive
6 Slightly attractive
5 Neither attractive nor unattractive
4 Slightly unattractive
3 Moderately unattractive
2 Very unattractive
1 Extremely unattractive

This rating scale was printed below each of the 80 stimulus faces.

The booklet

The 80 pages of the stimulus faces and rating scales were reduced to 15 cm by 21 cm pages. Booklets were put together using these 80 pages. Since the task of rating 80 faces was expected to cause fatigue effects in the subjects, the order of presentation

of faces was altered in each booklet, so that the face which was presented first in one booklet was presented second in the next booklet and the face that was presented last in the first booklet was presented first in the second booklet, and so on. As a result, each of the 80 faces was presented first at least once. To further counteract possible contrast and assimilation effects, half of the booklets were ordered in the opposite direction to the other half.

Faces of each of the four culture/gender groups were alternated throughout each booklet, so that each New Zealand female face was always followed by the same Japanese male face, which in turn was always followed by the same Japanese female face, etc. This order was reversed for half the booklets.

Figure 2 shows the title page with instructions. These are similar to the instructions used by Cunningham (1986).

Figure 2. Title page of the booklet.

A study into the perception of facial beauty

INSTRUCTIONS

1) Some Personal Details:

You are: (Tick one) MALE ( )
FEMALE ( )

How old are you? AGE = ... years

2) In this booklet you will find a total of 80 faces. You are requested to indicate how beautiful (or good-looking or physically attractive) you consider each face to be. In doing so, use your own personal standard of beauty. Don't be influenced by racial or ethnic factors, or whether you would want to go out with the person.

Below each face there is a rating scale ranging from 1 to 9. The meanings of the numbers are as follows:

9 = Extremely attractive
8 = Very attractive
7 = Moderately attractive
6 = Slightly attractive
5 = Neither attractive nor unattractive
4 = Slightly unattractive
3 = Moderately unattractive
2 = Very unattractive
1 = Extremely unattractive

On each scale, please circle the number which you think best represents the face above it.

THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION.

3. Stimulus materials for Japanese subjects

The title page and rating scale were translated into Japanese by a professional translator. These translations were then translated back into English by a third year Japanese student at the University of Canterbury. This second translation was then given to the first translator who made a few minor alterations to produce the final translation.

The Japanese rating scales were printed with the 80 stimulus faces in the same way as the booklets for New Zealand subjects. Booklets were put together in an identical way to the booklets for New Zealand subjects.

To avoid the high cost of returning all the booklets from Japan, the procedure for Japanese subjects was modified. Japanese subjects were required to enter their responses on an answer sheet rather than the booklet itself. The answer sheets were created with eighty 9-point rating scales printed on them with a new set of instructions. The instructions on the title page of the booklet were also modified. These new instructions were again translated by the professional translator mentioned above. This time, the translations were checked by a lecturer in the Japanese department at the University of Canterbury. One modification was made.

In order to ensure that the Japanese subjects entered the correct rating for the correct face on the answer sheet, each face in each booklet was numbered. Each booklet had a code number which corresponded to the first face in the booklet. This code number was entered by each subject on the answer sheets.

See Appendix A for instructions and answer sheets and their translations.

See Appendix B for examples of the first five pages of a New Zealand sample booklet and a Japanese sample booklet.

4. Apparatus for facial feature measurements

The original 80 photographs were made into slides, which were projected onto a 50 cm by 75 cm paper screen. The screen was moveable and had a large T drawn on it so that the horizontal line could be placed across the pupils of a face and the vertical line right through the middle of the face. A plastic, transparent, 40 cm ruler was used to make the measurements.

5. Procedure

Attractiveness ratings in New Zealand

Booklets were distributed to second year psychology students during laboratory classes. The subjects were instructed to read the instructions and rate each face on attractiveness. In addition to writing down their sex and age, subjects were requested to write down their country of birth. Responses from people other than New Zealanders and those who were not caucasian were not included in the data analysis. It took the subjects between 10 and 15 minutes to complete the booklets. Fifty booklets completed by females and 50 booklets completed by males were used for data analysis.

Attractiveness ratings in Japan

A hundred booklets and 100 answer sheets were sent to Professor Oba, Department of Psychology at the Okayama University in Okayama, Japan. The instructions sent to Professor Oba are presented in appendix C. Both the English and the Japanese versions of the letter were sent.

Measurements of facial features

Facial features were measured following Cunningham's (1986) guidelines. Figure 3 shows the measurements made and the ratios derived from them. Because the projections of the faces varied in size, the raw measurements were transformed into ratios by dividing them by either the lenth of the face, the width of the face at the cheekbones, or the width of the face at the mouth level, as indicated in figure 3.

One measurement differed from those used in Cunningham's (1986) study. Whilst Cunningham measured the length of the face from the hairline to the base of the chin, this was not done in the present study because the hairline was not visible in the majority of faces. Instead the length of the face was measured as the distance from a horizontal line over the eyes' pupils to the base of the chin.

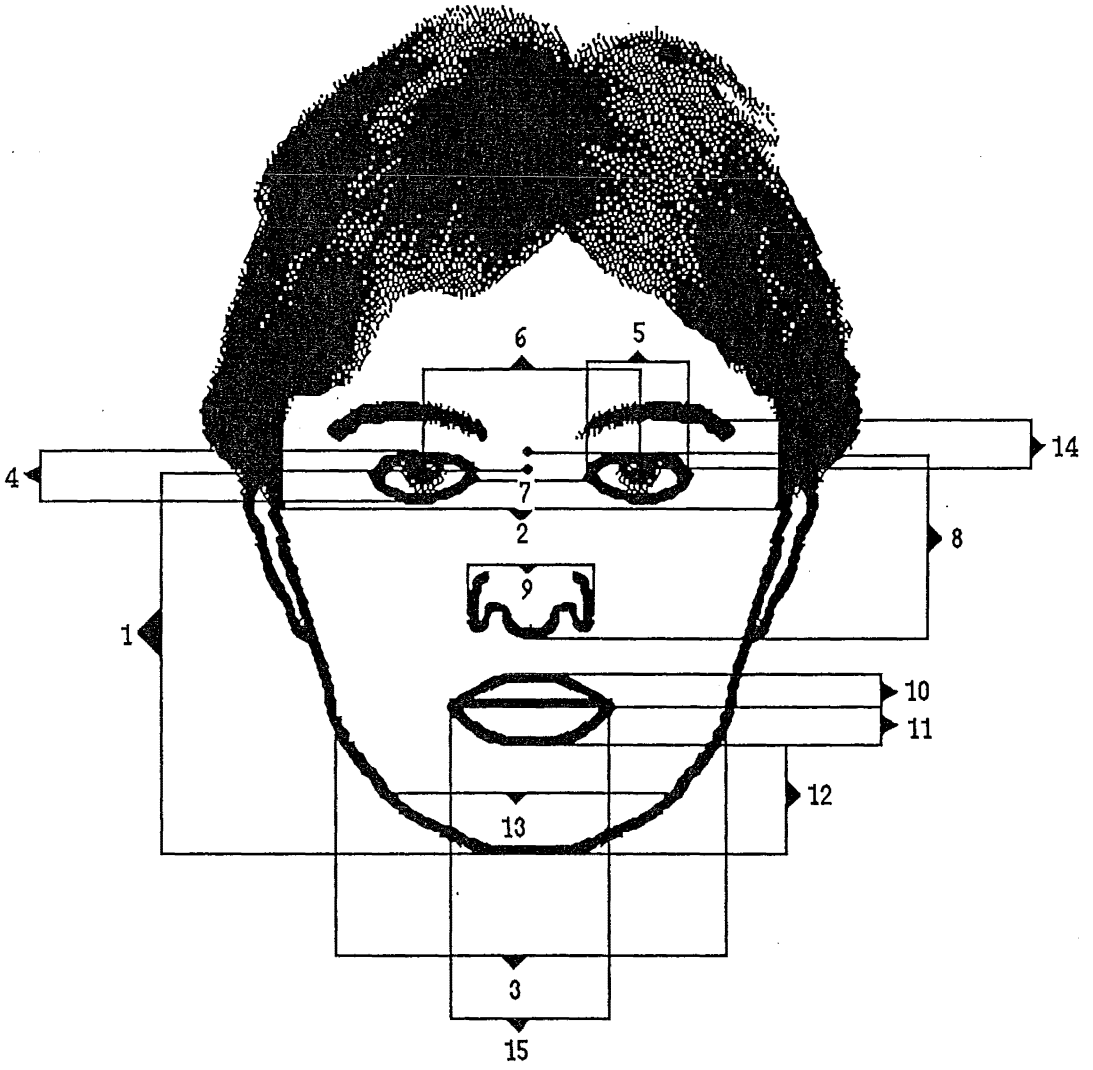
A few measurements in addition to Cunningham's measurements were made because they were predicted to be related to attractiveness. These were: The width of the chin, chin area and seperation of the eyes measured between the inner corners of the eyes.

The size of the forehead was not measured because of the difficulty of identifying the hairline. Pupil sizes were not measured because they were not

clearly visible on all the faces.

All measurements indicated in figure 3 were taken on each of the 80 faces. Note that in measurements concerning the eye, measurements on both eyes were taken and the average of these two measurements was recorded.

Figure 3. Measurements of the facial features.



Measurements used for ratios:

1 = Length of face; distance from pupils to base of chin.

2 = Width of face at the pupils; distance between outer edges of cheekbones at their most prominent point.

3 = Width of face at the mouth, distance between outer edges of cheeks at height of mouth.

Neonate, mature and expressive features:

4 = Eye height; distance between upper and lower eyelids across the pupil / length of face.

5 = Eye width; distance between inner and outer corner of the eye / width of

face at cheekbones.

6 = Eye seperation (a); distance between pupil centres / width of face at cheekbones.

7 = Eye seperation (b); distance between inner corners of the eyes / width of face at cheekbones.

8 = Nose length; distance between upper eyelids and bottom edge of nose / length of face.

9 = Nose width (a); distance between outer edges of nose tip / width of face at mouth. Nose width (b); distance between outer edges of nose tip / width of face at cheekbones.

10 = Thickness of upper lip; distance between upper and lower edges of the upper lip at centre / length of face.

11 = Thickness of lower lip; distance between upper and lower edges of lower lip at centre / length of face.

12 = Chin length; distance between lower edge of lower lip and base of chin / length of face.

13 = Chin width; distance between outer edges of cheeks at halfway chin length / length of face.

14 = Eyebrow height; distance between pupil centre and bottom edge of eyebrow / length of face.

15 = Mouth width; distance between outer edges of mouth across the middle of the mouth / width of face at mouth.

Not shown:

16 = Nose area; nose length X nose width / length of face.

17 = Chin area; chin width X chin length / length of face.

18 = Cheekbone width (a); width of face at the cheekbones - width of the face at the mouth / length of the face. Cheekbone width (b); width of face at the cheekbones - width of the chin / length of the face. Cheekbone width (c); width of face at the cheekbones / length of the face.

19 = Cheek width; width of face at mouth / length of face.

20 = Mid-face length; distance between pupil centres and the upper edge of the upper lip / length of the face.

RESULTS

1. Summary statistics of attractiveness ratings by each subject group

The attractiveness ratings were divided into sixteen cells, representing ratings of each of the four stimulus groups by each of the four subject groups. A 4 by 4, 2 factor repeated measures analysis of variance was conducted, using the subject groups as independent variables and the stimulus groups as dependent variables.

Significant main effects were found between groups ($F(3, 3) = 6.662$, $p < .001$) and within groups ($F(3, 3) = 120.912$, $p < .001$). A significant interaction effect was also found ($F(3, 9) = 10.818$, $p < .001$). Table 1 shows the means, standard deviations and ranges of the attractiveness ratings made by each subject group. Figure 4 illustrates the means in graphical form.

Table 1. Summary statistics of attractiveness ratings by the four subject groups.

		STIMULUS GROUP											
		NZ Females			NZ Males			Jap Females			Jap Males		
		Mean	SD	Rge	Mean	SD	Rge	Mean	SD	Rge	Mean	SD	Rge
SUBJECT GROUP	NZ Males	5.484	.947	3.362	4.482	.639	2.540	4.734	.643	2.740	4.224	.316	1.180
	NZ Females	5.395	.900	3.380	4.601	.915	3.060	5.042	.617	2.240	4.503	.567	2.040
	Jap Males	4.764	.686	2.640	4.767	.584	1.900	4.613	.810	3.086	4.293	.669	2.460
	Jap Females	4.639	.861	3.240	4.094	.751	2.400	4.397	.798	2.980	4.012	.818	2.880

A posteriori tests (Tukey tests) were performed to determine significant differences between the reported means.

Stimulus groups

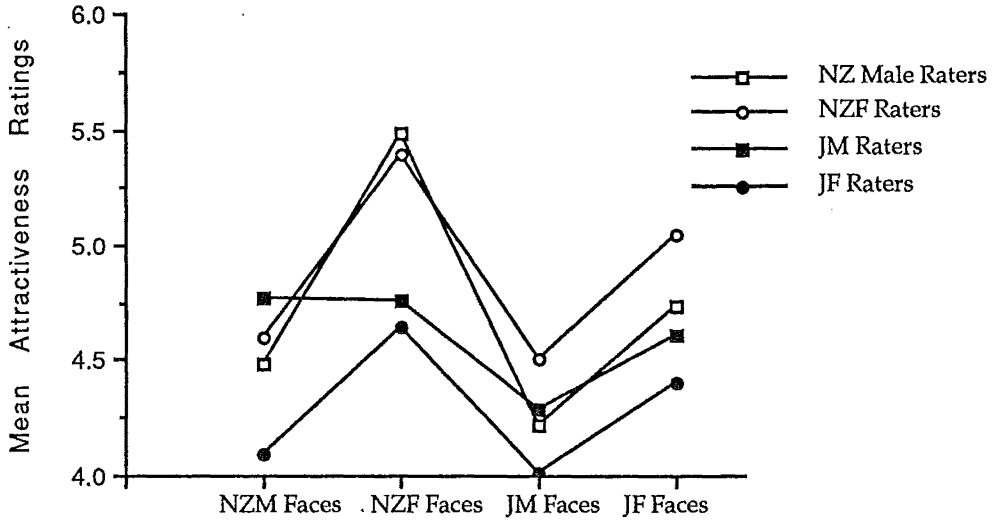
Overall, New Zealand females were found to be most attractive, followed by Japanese females, then New Zealand males; Japanese males were rated least attractive. The differences between each of these means were significant ($p < .01$).

Subject groups

Overall, Japanese females gave stimulus faces significantly lower mean ratings than New Zealand females ($p < .01$) and New Zealand males ($p < .05$). Male and female subjects' means within each culture did not differ significantly, with one exception. Japanese male subjects gave New Zealand male faces significantly higher ratings than Japanese female subjects ($p < .01$). As figure 4 shows, Japanese male subjects actually went against the trend of the graph by giving New Zealand male faces the highest mean rating. This result appeared to be the main contributor to the significant interaction effect.

New Zealand subjects combined gave significantly higher ratings than Japanese raters combined ($F (3, 196) = 4.354$, $p < .01$).

Figure 4.
Mean attractiveness ratings of stimulus groups by subject groups



As table 1 shows, the ratings in each cell have relatively narrow ranges; the smallest being 1.18 for New Zealand males rating Japanese males, and the largest 3.38 for New Zealand females rating New Zealand females. Bearing in mind that a 9 point rating scale was used, this indicates that the sample of stimulus faces did not vary much in attractiveness and included no outstandingly attractive or unattractive faces.

Table 1 shows that, in general, within each culture, male subjects rate female faces with more variability than female subjects; while female subjects rate male faces with more variability than male subjects, as is shown by the reported standard deviations. The only exception to this finding is between Japanese males and females rating New Zealand females, where Japanese males show a lower standard

deviation than Japanese females.

Similarly, for each stimulus group, the highest reported standard deviations are in the ratings made by subjects from the same culture as the stimulus group. The only exception here is Japanese female subjects' ratings of New Zealand male faces showing a larger standard deviation than New Zealand male subjects' ratings of New Zealand male faces.

It appears that in general, when rating attractiveness, subjects discriminate between stimulus faces most if the faces are of the same culture and of the opposite gender, whilst they discriminate the least when the stimulus faces are of an other culture and of the same gender.

2. Agreement between subject groups

The mean rating from each subject group was calculated for each face. Using these means, correlations were calculated between the subject groups, and are presented in Tables 2 and 3. All correlation coefficients reported are significant ($p < .01$).

Table 2. Correlations of mean attractiveness ratings between subject groups: Female faces. (Stimulus groups consist of 20 faces each).

Jap Female Faces / NZ Female Faces	NZ Males	NZ Females	Jap Males	Jap Females
NZ Males	-	.930	.645	.599
NZ Females	.958	-	.794	.776
Jap Males	.705	.721	-	.919
Jap Females	.656	.713	.961	-

Table 3. Correlations of mean attractiveness ratings between subject groups: Male faces. (Stimulus groups consist of 20 faces each).

Jap Male Faces / NZ Male faces	NZ Males	NZ Females	Jap Males	Jap Females
NZ Males	-	.884	.586	.507
NZ Females	.942	-	.710	.652
Jap Males	.536	.536	-	.903
Jap Females	.576	.622	.898	-

Intra-cultural correlations

Both New Zealand and Japanese subjects showed high correlations between male and female subjects. New Zealand males and females agreed most on New Zealand female faces (r = .958), followed by New Zealand male faces (r = .942), then Japanese female faces (r = .930) and agreed least on Japanese male faces (r = .884).

Japanese males and females also had highest agreement over New Zealand female faces (r = .961). The next highest agreement was over Japanese females r = .919), then Japanese males (r = .903), and least agreement was found over New Zealand males (r = .898).

Inter-cultural correlations

Moderately high correlations were found between subject groups from the two different cultures. These correlations range from r = .507 between New Zealand males and Japanese females rating Japanese male faces, to r = .794 between New Zealand females and Japanese males rating Japanese female faces.

A consistent, though not statistically significant ($p > .05$), feature is that female stimulus faces produce higher inter-cultural correlations than male stimulus faces. Correlations for female faces have a mean of .701, compared to correlations for male faces having a mean of .591.

3. Correlations with facial features

The mean attractiveness ratings of the stimulus faces were correlated with their feature measurement ratios. These correlations were conducted seperately for each stimulus group and each subject group. Linear zero-order correlations were conducted. Curvilinear relations were also explored by using correlations between the quadratic terms of the feature measurement ratios and the mean attractiveness ratings. The linear and curvilinear correlations for each stimulus group are presented in tables 4, 5, 6 and 7.

Table 4. Correlations of feature measurement ratios with mean attractiveness ratings: New Zealand Female stimulus faces.

	Linear Correlations				Curvilinear Correlations			
	SUBJECT GROUP				SUBJECT GROUP			
Neonate Features	NZM	NZF	JM	JF	NZM	NZF	JM	JF
Eye height	.388*	.317	.657+	.644+	.532*	.584**	.748+	.713+
Eye width	.171	.193	.321	.347	.171	.193	.469	.430
Eye seperation (a)	-.328	-.300	-.189	-.161	.464	.410	.257	.252
Eye seperation (b)	-.297	-.246	-.339	-.282	.315	.247	.344	.282
Nose length	-.003	.010	.613+	.577+	.381	.371	.621**	.579**
Nose width (a)	-.056	.051	.334	.417*	.322	.282	.335	.417
Nose width (b)	-.230	-.145	.078	.122	.241	.199	.121	.183
Nose area	-.147	-.025	.277	.313	.311	.302	.285	.314
Upper lip	-.062	.067	-.204	-.127	.069	.067	.223	.128
Lower lip	.437*	.543**	.604+	.620+	.473	.579**	.701+	.703+
Chin length	-.092	-.169	-.612+	-.672+	.367	.480	.695+	.805+
Chin width	-.173	-.243	-.566+	-.656+	.403	.521*	.653+	.804+
Chin area	-.091	-.114	-.576+	-.612+	.317	.436	.696+	.808+
Mature Features								
Mid-face length	-.057	-.139	.374	.375	.127	.148	.376	.382
Cheek width	.168	.034	-.113	-.202	.317	.242	.320	.338
Cheekbone width (a)	.300	.357	.645+	.733+	.509*	.574**	.666+	.765+
Cheekbone width (b)	.342	.363	.719+	.787+	.457	.548**	.778+	.877+
Cheekbone width (c)	.370	.244	.228	.168	.548**	.476	.347	.330
Expressive Features								
Eyebrow height	.294	.157	-.090	-.097	.294	.157	.099	.097
Mouth width	.054	.047	.341	.344	.246	.239	.346	.363

Note. * = p <.1

** = p < .05

+ = p < .01

Table 5. Correlations of feature measurement ratios with mean attractiveness ratings: Japanese Female stimulus faces.

	Linear Correlations				Curvilinear Correlations			
	SUBJECT GROUP				SUBJECT GROUP			
Neonate Features	NZM	NZF	JM	JF	NZM	NZF	JM	JF
Eye height	.127	.148	.048	.147	.128	.149	.074	.198
Eye width	-.099	-.037	-.058	.074	.124	.148	.060	.095
Eye seperation (a)	-.226	-.295	-.499**	-.404*	.234	.309	.525*	.482
Eye seperation (b)	.093	-.059	-.360	-.367	.182	.140	.362	.367
Nose length	.575+	.523**	.383	.392*	.637**	.610**	.390	.396
Nose width (a)	-.319	-.355	-.406	-.150	.319	.356	.414	.151
Nose width (b)	-.332	-.335	-.462**	-.231	.333	.346	.476	.231
Nose area	-.046	-.159	-.309	-.117	.195	.168	.348	.199
Upper lip	-.160	-.345	-.469**	-.367	.161	.352	.482	.409
Lower lip	.346	.449**	.185	.213	.465	.511*	.217	.271
Chin length	-.272	-.249	.021	.015	.273	.257	.048	.032
Chin width	-.168	-.203	-.398	-.314	.222	.257	.463	.315
Chin area	-.260	-.341	-.321	-.257	.306	.361	.328	.032
Mature Features								
Mid-face length	.258	.253	.263	.180	.258	.253	.288	.184
Cheek width	.041	.007	-.140	-.068	.349	.210	.143	.145
Cheekbone width (a)	.169	.091	.300	.157	.302	.278	.378	.170
Cheekbone width (b)	.244	.224	.425*	.316	.332	.306	.467	.317
Cheekbone width (c)	.255	.125	.217	.125	.451	.296	.275	.194
Expressive Features								
Eyebrow height	.064	-.164	-.326	-.275	.334	.383	.387	.323
Mouth width	-.049	.122	.187	.325	.171	.220	.289	.366

Note. * = p <.1

** = p < .05

+ = p < .01

Table 6. Correlations of feature measurement ratios with mean attractiveness ratings: New Zealand male stimulus faces.

	Linear Correlations				Curvilinear Correlations			
	SUBJECT GROUP				SUBJECT GROUP			
Neonate Features	NZM	NZF	JM	JF	NZM	NZF	JM	JF
Eye height	.037	.080	.145	.182	.364	.372	.257	.321
Eye width	-.278	-.308	-.146	-.004	.280	.308	.148	.280
Eye seperation (a)	.107	.239	.265	.299	.172	.264	.266	.172
Eye seperation (b)	.284	.346	.418*	.319	.422	.451	.432	.422
Nose length	-.029	-.101	.097	.257	.311	.259	.349	.399
Nose width (a)	.095	.129	.066	.259	.417	.366	.523*	.493*
Nose width (b)	.259	.330	.096	.304	.286	.330	.496*	.433
Nose area	.233	.220	.106	.324	.303	.267	.224	.462
Upper lip	.004	-.075	.049	-.041	.175	.166	.220	.248
Lower lip	.120	.085	.108	.236	.397	.325	.300	.346
Chin length	.556**	.544**	.030	-.015	.561**	.559**	.283	.325
Chin width	.468**	.510**	-.055	-.004	.519**	.605**	.198	.410
Chin area	.597+	.577+	-.068	-.050	.634**	.611**	.155	.234
Mature Features								
Mid-face length	-.154	-.089	.152	.261	.164	.129	.164	.403
Cheek width	.243	.318	-.078	-.018	.312	.368	.312	.051
Cheekbone width (a)	-.193	-.186	.115	.188	.236	.286	.236	.273
Cheekbone width (b)	-.227	-.213	.000	.040	.302	.235	.302	.145
Cheekbone width (c)	.210	.273	-.093	.033	.214	.282	.214	.093
Expressive Features								
Eyebrow height	.356	.455**	-.129	.092	.357	.495	.357	.221
Mouth width	-.281	-.262	-.143	-.056	.338	.383	.338	.160

Note. * = $p < .1$

** = $p < .05$

+ = $p < .01$

Table 7. Correlations of feature measurement ratios with mean attractiveness ratings: Japanese male stimulus faces.

	Linear Correlations				Curvilinear Correlations			
	SUBJECT GROUP				SUBJECT GROUP			
Neonate Features	NZM	NZF	JM	JF	NZM	NZF	JM	JF
Eye height	.438*	.559**	.252	.340	.440	.586**	.252	.340
Eye width	.099	.294	.049	.139	.276	.356	.084	.139
Eye seperation (a)	-.255	-.182	-.231	-.079	.410	.462	.347	.309
Eye seperation (b)	-.177	-.224	-.234	-.224	.195	.266	.477	.576**
Nose length	.048	.049	.015	.049	.057	.188	.300	.413
Nose width (a)	.051	-.088	-.154	-.088	.468	.492*	.467	.446
Nose width (b)	.028	-.271	-.393*	-.489**	.050	.290	.395	.491*
Nose area	.022	-.082	-.274	-.198	.179	.240	.274	.260
Upper lip	.014	.142	-.147	-.051	.022	.217	.187	.253
Lower lip	-.011	.028	-.149	-.420	.178	.121	.212	.452
Chin length	.020	-.004	.028	.280	.227	.272	.138	.320
Chin width	-.124	-.158	-.181	-.225	.191	.217	.222	.239
Chin area	-.068	-.033	-.079	.108	.421	.289	.236	.154
Mature Features								
Mid-face length	.104	.030	.264	.128	.186	.110	.357	.436
Cheek width	.144	.079	-.100	-.402	.182	.093	.146	.422
Cheekbone width (a)	.071	.356	.438*	.549+	.449	.471	.452	.557**
Cheekbone width (b)	.240	.365	.322	.244	.263	.413	.349	.323
Cheekbone width (c)	.225	.407*	.283	.026	.235	.408	.305	.166
Expressive Features								
Eyebrow height	.035	.092	.123	-.024	.323	.469	.430	.503*
Mouth width	.036	-.088	-.115	-.202	.144	.081	.115	.205

Note. * = $p < .1$

** = $p < .05$

+ = $p < .01$

The greatest number of significant correlations was found for New Zealand female features (a total of 38), followed by New Zealand male features (13), then Japanese female features (7), Japanese male feature ratios yielded the smallest number of significant correlations (6).

Significant curvilinear correlations as well as significant linear correlations were found. In most cases, a significant linear correlation for a measurement ratio was also found to be significant in the quadratic term.

Most significant linear correlations were in the predicted direction. Exceptions are: Japanese subjects rating longer noses in New Zealand female faces as more attractive; Japanese subjects rating thinner upperlips and eyes closer together in Japanese female faces as more attractive; New Zealand subjects rating longer noses as more attractive in Japanese female faces.

Scattergrams (see Appendix D) show that out of the 32 significant curvilinear correlations, only four are curved in the predicted direction; ie with the average being rated as most attractive. These were Cheekbone Width (c) in New Zealand female faces as rated by New Zealand male raters; Nose Length in Japanese female faces as rated by New Zealand male and female raters; and Eye Height in Japanese male faces as rated by New Zealand female raters. The first two of these graphs are negatively skewed so that the most attractive point is nearer the largest measurement and the largest measurement is only slightly below this point; whilst the latter has its most attractive point just before the largest measurement.

The remaining curvilinear correlations are all in the opposite direction, with the most attractive point being at one of the extremes, and the least attractive being somewhere between the two extremes. The scattergrams for these are positively skewed (where the least attractive point is nearer the smallest measurement and the smallest measurement is only slightly above this point) for Eye Height, Nose Length, Lower Lip, Cheekbone Width (a) and Cheekbone Width (b) in New Zealand female faces; for Chin Length, Chin Width and Chin Area in New Zealand male faces; and for Cheekbone Width (a) in Japanese male faces. They are negatively skewed (where the least attractive point is nearer the largest measurement and the largest measurement is only slightly above this point) for Chin length, Chin Width and Chin Area in New Zealand female faces; and for Eye Seperation (b) in Japanese male faces.

As predicted, very similar correlations were found for the two genders within each culture.

Between cultures, however, several differences were found. In rating New Zealand female faces, measurements of the chin, nose and cheekbones were significantly correlated with Japanese subjects' ratings, but not with New zealand subjects' ratings, (except for curvilinear correlations with cheekbone measurement ratios). In rating Japanese female faces, nose length and lower lip thickness appeared to be important for New Zealand subjects but not for Japanese subjects, whereas the reverse was true for eye seperation and upper lip. In rating New Zealand males, measurements of the chin and eye brow height were significantly correlated with New Zealand subjects' ratings, but not with Japanese subjects' ratings. Lastly, in rating Japanese males, Japanese subjects' ratings were significantly correlated with cheekbone width and nose width, whereas New Zealand subjects' ratings only correlated significantly with eye height.

So, bearing in mind that inter-cultural correlations of attractiveness rating means were all moderately high, it appears that the two cultures may concentrate on different facial features when judging attractiveness.

4. Regression analyses

Stepwise multiple regression analyses using the significant correlations were conducted for each subject group rating each stimulus group in order to determine which of the feature measurement ratios were the best predictors of attractiveness and how much of the variance in attractiveness ratings was explained by the significant measurement ratios used. In order to incorporate the significant quadratic correlations into this linear multiple regression model, the data for those feature measurements were transformed into fitted values. The calculations of the regression analyses and the scattergrams for the significant predictors are presented in appendix E.

New Zealand female faces

For New Zealand male raters a simple regression was sufficient since only one correlation was significant. The resulting equation was significant ($F(1, 18) = 7.739$, $p < .05$) and the variance accounted for was $R^2 = .301$. The significantly contributing predictor was the quadratic term of Cheekbone Width (c) ($ß = .548$, $t = 2.782$, $p < .05$).

For New Zealand female raters the resulting equation was significant (F (2, 17)

= 9.812, $p < .01$) and the variance accounted for was $R^2 = .536$. The significantly contributing predictors were the quadratic terms of Eye Height (ß = .469, t = 2.746, $p < .05$) and Cheekbone Width (a) (ß = .456, t = 2.67. $p < .05$).

For Japanese male raters the resulting equation was significant (F (2, 17) = 18.709, $p < .001$) and the variance accounted for was $R^2 = .688$. The significantly contributing predictors were the quadratic terms of Eye Height (ß = .400, t = 2.113, $p < .05$) and Cheekbone Width (b) (ß = .499, t = 2.637, $p < .05$).

For Japanese female raters the resulting equation was significant (F (1, 18) = 59.731, $p < .001$) and the variance accounted for was $R^2 = .768$. The only significantly contributing predictor was the quadratic term of Cheekbone Width (b) (ß = .877, t = 7.729, $p < .01$).

Japanese female faces

For New Zealand male raters the resulting equation was significant (F (1, 18) = 12.287, $p < .01$) and the variance accounted for was $R^2 = .406$. The only significantly contributing variable was the quadratic term of Nose Length (ß = .637, t = .3.505, $p < .01$).

For New Zealand female raters the resulting equation was significant F (1, 18) = 10.156, $p < .01$) and the variance accounted for was $R^2 = .544$. The significantly contributing variables were Lower Lip (ß = .416, t = 2.536, $p < .05$) and the quadratic term of Nose Length (ß = .587, t = 3.578, $p < .01$).

For Japanese male raters the resulting equation was significant (F (1, 18) = 5.979, $p < .05$) and the variance accounted for was $R^2 = .249$. The only significantly contributing variable was Eye Seperation (a) (ß = -.499, t = 2.445, $p < .05$).

No regression analysis was performed for Japanese female raters because none of the reported correlations were significant.

New Zealand male faces

For New Zealand male raters the resulting equation was significant (F (1, 17) = 11.407, $p < .01$) and the variance accounted for was $R^2 = .402$. The only significantly contributing variable was the quadratic term for Chin Area (ß = .634, t = 3.377, $p < .01$).

For New Zealand female raters the resulting equation was significant (F (1, 17) = 10.116, $p < .01$) and the variance accounted for was $R^2 = .373$. The only significantly contributing variable was the quadratic term for Chin Area (ß = .611, t = 3.181, $p <$

.01).

Regression analyses were not conducted for Japanese male and female raters because no significant correlations were found.

Japanese male faces

For New Zealand female raters the resulting equation was significant ($F(1, 18) = 9.4$, $p < .01$) and the variance accounted for was $R^2 = .343$. The only significantly contributing variable was the quadratic term for Eye Height (ß = .586, $t = 3.066$, $p < .01$).

For Japanese female raters the resulting equation was significant ($F(2, 17) = 10.2$, $p < .01$) and the variance accounted for was $R^2 = .545$. the two significantly contributing variables were the quadratic terms of Eye Seperation (b) (ß = .493, $t = 2.965$, $p < .01$) and Cheekbone Width (ß = .470, $t = 2.829$, $p < .05$).

Regression analyses were not conducted for New Zealand male and Japanese male raters because no significant correlations were found for these subject groups.

5. Combined correlations with male and female facial features from both cultures

The fact that few of the expected feature ratios were significantly correlated with attractiveness ratings may have been due to small sample sizes and low variances in the ratings for each of the four stimulus groups. This was especially true for male faces of both cultures. Therefore the data for New Zealand and Japanese male faces and New Zealand and Japanese female faces were combined to provide a larger sample, a wider spread of ratings and hopefully more significant correlations with facial feature ratios, as well as more variance in attractiveness accounted for.

To do this meaningfully, it must be assumed that members of one culture apply the same criteria of attractiveness to faces from different cultures. However, this may be more clearly the case for female faces than it is for male faces. Comparisons of the directions of the linear correlations for the two stimulus groups from both genders show that for each subject group, 15 or 16 out of the 20 feature measurement correlations are in the same direction for female faces from both cultures, whilst only between 6 and 10 out of the 20 feature measurements are in the same direction for male faces from both cultures. This finding suggests that subjects

from both cultures tend to apply different criteria of attractiveness for male faces from different cultures more often than they do for female faces from different cultures.

The linear and curvilinear correlations beween attractiveness ratings and feature measurement ratios for female and male faces are presented in tables 8 and 9.

Table 8. Correlations of feature measurement ratios with mean attractiveness ratings: All female faces.

	Linear Correlations				Curvilinear Correlations			
	SUBJECT GROUP				SUBJECT GROUP			
Neonate Features	NZM	NZF	JM	JF	NZM	NZF	JM	JF
Eye height	.487+	.353**	.297*	.408+	.514+	.440+	.522+	.566+
Eye width	.112	.088	.044	.155	.339	.239	.110	.215
Eye seperation (a)	-.279*	-.298*	-.365**	-.286*	.328	.346*	.411**	.374*
Eye seperation (b)	-.392**	-.276*	-.361**	-.329**	.415**	.287	.323	.331
Nose length	.125	.151	.477+	.476+	.385*	.336	.493+	.481+
Nose width (a)	-.364**	-.236	-.155	.003	.365*	.236	.162	.111
Nose width (b)	-.444+	-.311*	-.271*	-.150	.445**	.317	.313	.213
Nose area	-.349**	-.221	-.160	-.075	.359*	.221	.213	.130
Upper lip	-.364**	-.212	-.299*	-.262	.364*	.241	.319	.285
Lower lip	.496+	.531+	.380**	.439+	.543+	.586+	.470+	.542+
Chin length	-.093	-.164	-.247	-.311*	.193	.292	.256	.328
Chin width	.079	-.080	-.359**	-.368**	.211	.265	.415**	.398**
Chin area	-.139	-.193	-.439+	-.449+	.240	.341	.469**	.491+
Mature Features								
Mid-face length	.041	.010	.305*	.267*	.087	.066	.308	.281
Cheek width	.218	.080	-.090	-.108	.247	.166	.147	.196
Cheekbone width (a)	.058	.126	.374**	.329**	.123	.174	.379	.345*
Cheekbone width (b)	.026	.148	.436+	.422+	.190	.267	.469+	.429**
Cheekbone width (c)	.310*	.206	.215	.150	.384*	.357*	.265	.234
Expressive Features								
Eyebrow height	-.066	-086	-.224	-.223	.121	.176	.273	.247
Mouth width	.237	.192	.242	.336**	.243	.202	.251	.338

Note. * = p <.1

** = p < .05

+ = p < .01

Table 9. Correlations of feature measurement ratios with mean attractiveness ratings: All male faces.

	Linear Correlations				Curvilinear Correlations			
	SUBJECT GROUP				SUBJECT GROUP			
Neonate Features	NZM	NZF	JM	JF	NZM	NZF	JM	JF
Eye height	.220	.270*	.296*	.271*	.357*	.412**	.300	.290
Eye width	.024	-.027	.186	.087	.177	.268	.190	.098
Eye seperation (a)	-.005	.091	.004	.116	.005	.156	.140	.188
Eye seperation (b)	-.032	.091	-.149	-.013	.094	.095	.192	.168
Nose length	.053	-.038	.149	.172	.205	.214	.217	.278
Nose width (a)	-.112	.001	-.273*	.027	.293	.277	.435**	.353*
Nose width (b)	-.042	.032	-.356**	-.103	.177	.282	.488+	.435**
Nose area	-.036	.043	-.294*	.021	.159	.206	.336	.333
Upper lip	-.160	-.045	-.281*	-.070	.172	.046	.329	.147
Lower lip	.035	.049	-.082	-.133	.284	.212	.265	.329
Chin length	.429+	.376**	.046	.016	.453**	.396**	.075	.095
Chin width	.367**	.341**	-.047	-.134	.458**	.425**	.190	.190
Chin area	.296*	.315*	-.138	-.087	.296	.316	.140	.137
Mature Features								
Mid-face length	.002	-.027	.298*	.204	.007	.039	.298	.212
Cheek width	.277*	.255	.044	-.149	.284	.271	.048	.153
Cheekbone width (a)	-.155	-.001	.176	.349**	.193	.097	.194	.358*
Cheekbone width (b)	-.146	-.075	.084	.104	.148	.075	.284	.186
Cheekbone width (c)	.261	.319**	.165	.043	.280	.325	.197	.043
Expressive Features								
Eyebrow height	-.013	.166	-.267*	.017	.103	.206	.311	.019
Mouth width	-.051	-.124	.075	-.076	.264	.303	.169	.077

Note. * = $p < .1$

** = $p < .05$

+ = $p < .01$

Again, male and female raters within each culture were mostly in agreement over which feature ratios were correlated with attractiveness. Between-cultural agreement was found on some features whilst total disagreement was found on other features.

Correlations with female feature ratios

New Zealand male ratings were significantly correlated with the neonate feature ratios of Eye Height, Eye Seperation, Nose Width, Nose Area, Upper Lip and Lower Lip.

New Zealand female ratings were significantly correlated only with the neonate feature ratios of Eye Height and Lower Lip.

Japanese male ratings were significantly correlated with the neonate feature ratios of Eye Height, Eye Seperation, Nose Length, Lower Lip, Chin Width and Chin Area, as well as the mature feature ratios of Cheekbone Width.

Japanese female ratings had the highest number of significant correlations with feature ratios. These were the neonate feature ratios of Eye Height, Eye Seperation, Nose Length, Lower Lip, Chin Width and Chin Area, as well as the mature feature ratios of Cheekbone Width and the expressive feature ratios of Mouth Width.

Note that the significant correlations between Japanese male and female ratings and Eye Seperation and Nose Length actually are the reverse from what was predicted.

Just one of the significant curvilinear correlations was in the predicted direction (see Appendix F for the scattergrams). The one which had the most attractive point somewhere in between the two extremes was Eye Seperation (a) as rated by Japanese raters, which was positively skewed.

The remaining curvilinear correlations were positively skewed when the largest measurement was the most attractive, and negatively skewed when the smallest measurement was the most attractive. The positively skewed correlations were: Lower Lip and Eye Height as rated by New Zealand subjects; and Eye Height, Cheekbone Width (b), Nose Length and Lower Lip as rated by Japanese subjects. The negatively skewed correlations were: Eye Seperation (b) and Nose Width (b) as rated by New Zealand subjects; and Chin Width and Chin Area as rated by Japanese subjects.

Correlations with male feature ratios

New Zealand male ratings were significantly correlated with the mature feature ratios of Chin Length and Chin Width.

New Zealand female ratings were significantly with the neonate feature ratios of Eye Height, as well as the mature feature ratios of Chin Length, Chin Width and Cheekbone Width.

Japanese male ratings were only significantly correlated to the neonate feature ratios of Nose Width.

Japanese female ratings were also significantly correlated with the neonate feature ratios of Nose Width, as well as the mature feature ratios of Cheekbone Width.

Note that measurements of the chin are here being classed as mature features because the correlations found were positive, which means the larger the chin, the more attractive the face.

Three of the significant curvilinear correlations were in the predicted directions (See Appendix F for the scattergrams). These were: Eye Height as rated by New Zealand subjects; and Nose Width (a) and Nose Width (b) as rated by Japanese subjects. These correlations were only slightly skewed, which means that the most attractive point was somewhere near the mean measurement.

The other significant curvilinear correlations were Chin Length and Chin Length as rated by New Zealanders. These correlations were positively skewed.

6. Regression analyses on combined female and male correlations

Stepwise multiple regression analyses using the significant correlations were conducted in the same manner as for the four seperate stimulus groups. The calculations are presented in appendix G.

Female faces

For New Zealand male raters the resulting equation was highly significant ($F(2, 37) = 13.19$, $p < .001$) and the variance accounted for was $R^2 = ..416$. The significantly contributing predictors were the quadratic term of Nose Width (b) (ß = .355, $t = 2.774$, $p < .01$) and the quadratic terms of Lower Lip (ß = .476, $t = 3.718$, $p < .001$) and Cheekbone Width (c) (ß = .367, $t = 3.136$, $p < .01$).

For New Zealand female raters the resulting equation was significant ($F(1, 38) = 19.874$, $p < .001$) with the variance accounted for $R^2 = .343$. The only significantly contributing variable was the quadratic term of Lower Lip (ß = .586, t = 4.458, $p < .001$).

For Japanese male raters the resulting equation was again significant ($F(4, 35) = 10.691$, $p < .001$) and the variance accounted for $R^2 = .550$. Four variables were significant contributing predictors: Lower Lip (ß = .281, t = 2.349, $p < .05$) and the quadratic terms of Eye Height (ß = .309, t = 2.501, $p < .05$), Eye Seperation (a) (ß = .266, t = 2.273, $p < .01$) and Cheekbone Width (b) (ß = .367, t = 3.122, $p < .01$).

For Japanese female raters the resulting equation was also significant ($F(3, 36) = 12.275$, $p < .001$) and the variance accounted for was $R^2 = .506$. The three significantly contributing predictors were Lower Lip (ß = .293, t = 2.327, $p < .05$) and the quadratic terms of Eye Height (ß = .418, t = 3.298, $p < .01$) and Chin Width (ß = .352, t = 2.980, $p < .01$).

Male faces

For New Zealand male raters the resulting equation was significant ($F(2, 36) = 7.749$, $p < .01$) and the variance accounted for was $R^2 = .301$. The significantly contributing predictors were the quadratic terms of Chin Length (ß = .327, t = 2.171, $p < .05$) and Chin Width (c) (ß = .334, t = 2.221, $p < .05$).

The resulting equation for New Zealand female raters was significant ($F(2, 36) = 8.622$, $p < .001$). The variance accounted for was $R^2 = .324$. The significantly contributing predictors were the quadratic terms of Chin Width (ß = .340, t = 2.420, $p < .05$) and Eye Height (ß = .388, t = 2.761, $p < .01$).

For Japanes male raters the resulting equation was significant ($F(1, 38) = 11.875$, $p < .01$) and the variance accounted for was $R^2 = .238$. Just one variable was a significantly contributing predictor; the quadratic term of Nose Width (b) (ß = .488, t = 3.446, $p < .01$).

A similar resulting equation was found for Japanese females ($F(1, 38) = 8.861$, $p < .01$), with the variance accounted for $R^2 = .189$. The quadratic term of Nose Width (b) was the only significantly contributing predictor (ß = .435, t = 2.977, $p < ..01$).

DISCUSSION

1. Mean attractiveness ratings (Hypothesis 1)

As predicted, female faces received higher mean ratings than male faces, with New Zealand female faces receiving the highest ratings. Although the samples used were not large enough to be representative of the New Zealand and Japanese populations, these findings replicate the findings of several other studies which used different cultures (Bernstein et al, 1982; Cross and Cross, 1971; Maret, 1983).

It is interesting to note that both New Zealand and Japanese subjects preferred New Zealand females over Japanese females and New Zealand males over Japanese males. This and other cross-cultural research (eg Bernstein et al, 1982; Cross and Cross, 1971; Langlois and Stephan, 1977) suggests that in general caucasian faces are preferred over faces from other cultures. It is not certain if this is because of the lighter skin, the particular shapes and sizes of caucasian features, or some cultural reason such as caucasian fashion models, filmstars, etc being most frequently promoted as attractive. The following comment was made by Alley and Hildebrandt (1986):

> "Hulse (1967) concluded that social selection for light skin color among the Japanese has been strong enough to have exerted some genetic effect! Hence, the Japanese would probably assign higher attractiveness ratings to lighter skinned faces." (p 114).

A finding which is difficult to explain is that Japanese male subjects gave their highest ratings to New Zealand males, whereas the other three subject groups rated them third most attractive. Could this mean that Japanese males envy the looks of caucasian males and see their faces as having more ideal features than themselves?

2. Inter and intra- cultural agreement in perceptions of attractiveness (Hypotheses 2, 3 and 4)

As has been found in previous research, male and female subjects within each culture rated faces from both genders and both cultures very similarly, with coefficients of agreement ranging from .884 to .961. This indicates that within a culture, there is definitely a common standard of attractiveness for both males and

females.

Lower, yet moderately high correlations were found between raters from the two cultures, ranging from .507 to .794. This finding is in accordance with previous cross-cultural research where correlations varied between .47 (Madden and Hollingworth, 1932; reported in Shepherd, 1989) and .89 (Thakerar and Iwawaki, 1979).

The differences between correlation sizes in this and other cross-cultural studies may be influenced by several factors. Obviously, different cultures differ to some extent in their perception of facial attractiveness. However, sample sizes and variance in attractiveness ratings are also likely to influence correlation coefficients. If all stimulus faces used do not vary much in attractiveness it is more difficult for subjects to discriminate between them and therefore lower correlations would be expected. In the present study, no outstandingly attractive or unattractive faces were included. The mean range of attractiveness ratings was only 2.633 on a 9 point scale.

The present findings still show moderately high cross-cultural correlations, suggesting that there is an underlying, perhaps biologically determined, agreement between Japanese and New Zealand college students over facial attractiveness. The finding that intra-cultural correlations were higher still points to the fact that cultural determinants of perceived attractiveness also play a part.

Some evidence was found that these cultural determinants may affect the perception of attractiveness in male faces more than female faces, with correlations for male faces having a mean of .591 compared to .701 for female faces.

Two more results of interest, which may have influenced intra and inter-cultural correlations are the general findings that subjects of one gender rated faces of the opposite gender with more variability than faces of the same gender, and subjects in one culture rated faces of the other culture with less variability than faces of their own culture.

The first of these findings, which replicates findings by Kerr and Kurtz (1978), probably indicates that both New Zealand and Japanese subjects are more used to evaluating members of the opposite gender in terms of physical attractiveness and therefore these discriminations are more refined. This would of course be expected if facial attractiveness is an important consideration in mate choice.

The second finding is probably a similar effect in that faces of another culture have a tendency to "all look alike" (Malpass and Krevitz, 1969) and therefore discriminations between faces of another culture may be more difficult to make.

However, whilst this was the general finding in this study, no differences in variance were found in a study by Bernstein, Lin and McClellan (1982) which was specifically designed to investigate this hypothesis.

3. What facial features are attractive to Japanese and New Zealand subjects? (Hypotheses 5 and 6)

Several cross-cultural studies have come to the conclusion that subjects from different cultures use different criteria when rating attractiveness, eventhough cross-cultural ratings are quite highly correlated (eg Bernstein et al, 1982; Maret, 1983; Pollard, unpublished; Thakerar and Iwawaki, 1979; Wagatsuma and Kleinke, 1979), although most of these studies do not address the nature of these differences.

The present study supports this conclusion. Male and female subjects within one culture did not differ significantly in the features they found attractive. Cross-cultural comparisons however, showed that whilst both cultures agreed on the attractiveness of some feature sizes, they differed on others.

Are "average" features attractive?

This study failed to provide any real evidence for the hypothesis that "average" features are more attractive than either extremely large or extremely small features, ie the "central tendency hypothesis" (Symons, 1987; Langlois and Roggman, 1990). Only a few of the significant curvilinear correlations had the most attractive point near the mean and these relationships held true for raters from only one culture.

The finding that the average nose length in Japanese females and average eye seperation in the combined females were found to be most attractive by some subject groups is interesting in that the linear correlations for these features were in the direction opposite to the hypothesis. In male faces, average sized eyes and noses of average width were found to be more attractive. This compares to Cunningham et al (Unpublished), who found that eyes of average height and average sized noses were rated as most attractive. This could mean that males with very large eyes and/or small noses are perceived to be too "babyfaced" to be attractive.

All other significant curvilinear correlations more closely resembled linear correlations in that one of the extremes of the curve was always found to be the most attractive. This points to the conclusion that the reason why Galton (1883), Langlois

and Roggman (1990) and Pollard (Unpublished) found composite or "average" faces to be the most attractive may be that these faces have all or some of the appearance of smoother skin, symmetry or the absence of irregularities, or more evenly proportioned features, rather than the individual features being of average size. Since the above mentioned variables were not measured in the present study, it seems likely that they would account for a large proportion of the unexplained variance in the data.

Lack of significant correlations with hypothesized "expressive" feature measurements

In only two cases were the predicted expressive features significantly correlated with attractiveness ratings. This is hardly surprising given the fact that the stimulus faces wore neutral expressions. It seems reasonable to expect that these features will only be correlated with attractiveness ratings if the faces are actually showing positive expressions, ie smiles and raised eyebrows, as they were in Cunningham's (1986) study.

It is interesting to note that New Zealand female subjects actually preferred New Zealand male faces with higher eyebrows, a feature which is supposed to signify submissiveness (Guthrie,1976). Could this be a sign of the trend (eg as reported in popular women's magazines) in Western society in the late Eighties that Western women are no longer attracted to the "macho" type man and are instead attracted to the more gentle, caring (or submissive) type of man? Interestingly, Japanese subjects' ratings were either not correlated at all with measurements of male eyebrow height or were almost significantly negatively correlated, as in the case of Japanese male raters. It is also a popular observation that contemporary Japanese society is still very much divided on the basis of gender, where the man is expected to be dominant and the woman expected to be submissive.

It should also be noted that if the stimulus faces had been smiling, the female faces would probably have been rated even more attractive than male faces, as was found by Schulman and Hoskins (1986), possibly with the result that more of the feature measurements would be significantly correlated with attractiveness ratings.

Because of the similarity of most reported curvilinear correlations to the reported linear correlations and for the sake of simplicity, the following discussion will assume that these curvilinear correlations are in fact linear.

What female facial features are attractive?

Subjects from both cultures agreed most over which features were attractive in New Zealand female faces, probably because these faces also had the most significant feature ratio correlations. Both cultures had a tendency to find higher eyes, thicker lower lips, and wider cheekbones more attractive. However, only Japanese subjects had a strong tendency to find smaller chins and longer noses attractive. It appears that Japanese subjects rated New Zealand female faces much more like Cunningham's (1986) subjects than New Zealand subjects did.

The stepwise regressions show that eye height and cheekbone width were the most important predictors of attractiveness in New Zealand female faces for subjects of both cultures. This result is comparable to Cunningham' (1986) study where these two measurements represented the highest correlations with attractiveness ratings.

All significant correlations were in the predicted direction, except the correlation with nose length.

Bearing in mind that very few significant correlations were actually found, for Japanese female faces, no cross-cultural agreement was found on specific features. New Zealand subjects only saw long noses and thicker lower lips as more attractive, whereas Japanese subjects saw close-set eyes, narrow noses and thin upper lips as more attractive. Interestingly, two out of these three correlations went against the predicted direction (eye seperation and nose length).

It must be noted that although different female feature ratios were significantly correlated with attractiveness ratings by subjects from the two cultures, most correlations *were* in the predicted direction. Exceptions were eye separation, nose length, nose area (New Zealand female faces only), upper lip, mid-face length (New Zealand female faces only), cheek width and the expressive features.

This may indicate that there is an underlying cross-cultural agreement over the attractiveness of female faces, with the variation due to some features being emphasized more in some cultures than in others. The extent of cross-cultural agreement and disagreement in the attractiveness of female feature sizes would certainly be made a lot clearer if a greater number of stimulus faces had been used and a wider variation in attractiveness ratings obtained. It was with this rationale in mind that the Japanese and New Zealand female faces were combined for correlational purposes.

The combined data show that there was considerable cross-cultural agreement in that both cultures' attractiveness ratings were significantly or almost significantly

correlated with eye height, close-set eyes and thick lower lips. However, New Zealand subjects appeared to place more emphasis on smaller noses, whilst Japanese subjects placed more emphasis on long noses, small chins and wider cheekbones. The stepwise regressions show that lower lip thickness is the only consistent predictor of attractiveness across cultures.

As an overall conclusion, it appears from these data that both Japanese and New Zealand college students find some neonate features attractive. Large eyes and thick lower lips are consistently correlated with attractiveness ratings, while Japanese subjects concentrate more on small chins and New Zealand subjects concentrate more on small noses. Japanese subjects also find the mature feature of wide cheekbones attractive, whilst New Zealand subjects only find this feature attractive in New Zealand female faces.

The finding of the importance of the eyes and the mouth in female attractiveness is supported by previous research which found that ".... the eyes and mouth consistently have been the specific facial regions found to be most influential for facial attractiveness ratings" (Alley and Hildebrandt, 1986).

Cunningham (1986) found more significant correlations with predicted feature measurements than this study did for any single subject group-stimulus group combination. However, most of his significant correlations were replicated in this study at least once. The fact that these correlations were not found consistently may be partly due to cultural differences, but also because of the lack of highly attractive faces in the stimulus sample. Cunningham himself (1989, personal correspondence) found few significant correlations with feature measurements when very attractive faces were not included in the stimulus sample. Apparently when a more "average looking" sample is used, the only consistent predictors of attractiveness in both cultures are eye size and mouth size, with the other features more influenced by cultural differences.

Whilst Cunningham (1986) found large eyes to be important indicators of female attractiveness, he found no significant correlations with lip thickness, although he does point out that this may be due to the fact that his stimulus faces were smiling and therefore showed little variation in lip thickness. He did however find smile width to be strongly related to attractiveness.

The importance of lip thickness may reflect a current trend for full lips to be seen as attractive, as evidenced in current popular female filmstars and fashion models and the increasing use of surgery to increase women's lip size, as well as the

widespread use of cosmetics to make the lips appear fuller and brighter. Apparently against this interpretation however, is the finding that upper lips were either found to be uncorrelated to attractiveness ratings or negatively correlated.

What male facial features are attractive?

Very few significant correlations between feature measurements and attractiveness ratings were obtained for male stimulus faces, leaving most of the variance in attractiveness ratings unexplained by these data. Whilst the high inter-cultural correlations between attractiveness ratings indicate that there is cross-cultural agreement on at least some aspects of the male stimulus faces, the measures used in this study did not include these aspects.

In fact, there were no correlations which were found to be significant for one culture's subjects which were also found to be significant for the other culture's subjects. Also, it appears that subjects from the two cultures were applying different criteria of attractiveness to male faces from one culture than male faces from the other culture. Thus, New Zealand subjects' ratings were quite strongly correlated with measurements of longer, wider and larger chins and higher eyebrows in New Zealand male faces, but not Japanese male faces. Similarly, Japanese subjects' ratings were correlated with closely set eyes, narrower noses and wider cheekbones in Japanese male faces, but not in New zealand male faces. New Zealand subjects rated higher eyes in Japanese male faces more attractive, but not in New Zealand male faces. Lastly, Japanese subjects' ratings had no significant correlations with any of the New Zealand male feature measurements.

For each subject group about half the correlations with feature measurements of New Zealand male faces were in the opposite direction to the corresponding correlations for Japanese male faces. Not surprisingly then, when the data for male faces were combined, few additional significant correlations were found. These results indicate that it is less valid to combine cross-cultural data for male faces than it is for female faces.

Again, if more highly attractive male faces had been included in this study, there may have been more significant correlations with feature measurements, as was found by Cunningham et al (Unpublished), as well as more cross-cultural agreement on the attractiveness of certain features. The significant correlations which were found in this study are comparable to the findings of Cunningham et al (Unpublished). Using only caucasian stimulus faces, Cunningham et al also found

significant correlations with larger eyes, wider cheekbones and longer chins, as well as smaller noses, which may be comparable with the correlation with narrower noses in Japanese male faces. So although each culture found different features attractive, the findings are in accordance with the research by Cunningham et al.

The finding that New Zealand subjects found the mature feature of large chins attractive is also comparable to Keating's (1985) finding that "square" jaws in drawings of male faces were attractive. However, Keating's finding that thinner lips were attractive was not replicated.

As a general conclusion, New Zealand subjects appear to find the mature feature of large chins and the neonate or submissive features of high eyes and high eyebrows attractive, while Japanese subjects place emphasis on the mature feature of wide cheekbones and the neonate feature of narrow noses when rating attractiveness.

Sexual dimorphism and the Multiple Motive Hypothesis

Although attractiveness ratings were related to both mature and neonate features in faces from both genders, there was some evidence of sexual dimorphism in attractiveness, as described by Nakdimen (1984) and Guthrie (1976). New Zealand subjects rated male faces with larger chins as more attractive, whilst Japanese subjects rated female faces with smaller chins as more attractive; a similar result to those of Cunningham (1986) and Cunningham et al (Unpublished).

These results lend some support to the hypothesis that attractive males are those who portray more dominance, status and maturity while attractive females are those who portray youth and childlike features. However, the fact that attractive faces from both genders had both mature and babyish features lends support to Cunningham's (Unpublished) "Multiple Motive Hypothesis". This also backs up McArthur and Apatow's (1983-1984) finding that faces of intermediate maturity were most attractive, with attractive male faces tending towards the mature end of the continuum and attractive female faces tending towards the babyish end of the continuum. So it may be that people judge a face's attractiveness in terms of its "average" portrayal of maturity rather than its actual features being "average".

4. Limitations

What accounts for the remaining variance in attractiveness ratings?

The regression analyses conducted for the correlations between attractiveness ratings and feature measurements showed that a large percentage of the variance in attractiveness ratings in all four stimulus groups was not accounted for. As discussed earlier, one of the reasons is likely to be the lack of highly attractive faces in the stimulus sample. While an argument can be made that more attractive faces should be included (Cunningham, 1989, personal correspondence) to ensure more significant correlations with feature measurements, the sample used in the present study is probably a more realistic representation of the cross-section of society out of which most people choose their mates. Moreover, as the present finding of high intra- and inter-cultural correlations show, New Zealand and Japanese subjects were definitely discriminating on certain criteria, most of which were apparently not measured in this study. Even Cunningham's (1986; et al, Unpublished) data which found a much wider range of attractiveness ratings, only accounted for 52.5 % of the variance in attractiveness ratings for female faces, and 68.8 % of the variance in attractiveness ratings for male faces.

This leaves the question: What other facial characteristics account for the remainder of the variance in attractiveness ratings?

Obviously, more feature measurements can be made. While it seems that the possible measurements of individual features were well covered in this study, the measurement of configural features, ie spatial relations between different areas or features of the face, may uncover more variance in attractiveness ratings. For example, Rhodes (1988) found that both individual feature measurements and spatial relations between features determine a face's appearance when subjects are asked to judge the similarity between pairs of faces. In terms of attractiveness then, it may be for example that the position of the eyes in relation to the nose, mouth or cheekbones is as important a predictor of attractiveness as the size of the eyes. The extent to which a face's features are symmetrical may also be measured by comparing the size of features on the left side of the face to features on the right side of the face.

The actual shapes and contours of features are likely to be important influences on facial attractiveness as well. Keating (1985) found that angular jaws in male faces were more attractive than rounded jaws, and the reverse in female faces (though this difference was not statistically significant). Similarly, it may be that curved lips

are seen to be more attractive than straight-lined lips.

Another variable which was not controlled for in this study is hairstyle. Young (1989, unpublished) found a high correlation (r = .64) between attractiveness ratings of just the hairstyle of a sample of female faces and the attractiveness ratings of the same faces after subjects had been instructed to ignore the hairstyle. Cunningham et al (Unpublished) found a curvilinear relationship between attractiveness ratings and hair length in male faces.

Yet another variable which probably contributed to the variance in attractiveness ratings in the present study, is facial expression. even though the students posing for the stimulus photographs were instructed to wear a neutral expression, the resulting stimulus faces probably still varied along a scale of positive to negative expression, as perceived by subjects. Both Schulman and Hoskins (1986) and Terry (1979) found that facial expression made important contributions to ratings of attractiveness.

The procedure used in this study meant that each face was always followed and preceded by one of the same two faces, for each subject. The relative attractiveness of these faces may have influenced attractiveness ratings for some faces (Melamed and Moss, 1975). This effect would have made a further contribution to the variance in attractiveness ratings.

Improvements on current study

Taking the above limitations into account, the following recommendations for research of this kind can be made:

1. A larger number of faces should be included in each of the stimulus groups. This should ensure a wider range in attractiveness ratings and thus a wider range in individual feature measurements.

2. When taking the photographs for the stimulus sets, the models should have their hair tied back. Then, if the method of digitizing the faces is used, each face can be given the same haircut. This ensures that subjects are discriminating facial features rather than hairstyles when rating attractiveness.

3. An initial screening should ask subjects to rate each face on how much expression it portrays. Only faces portraying "neutral" expressions should be retained for the attractiveness study.

4. In order to further prevent contrast and assimilation effects (Wedell, Parducci and Geiselman, 1987), the stimulus faces should be presented in a truely

random order which is different for each subject.

5. More accurate measurements of feature sizes could be obtained in two ways. When each face has an identical haircut, it will be easier to project each face to cover the same area. This way, direct measurements rather than ratios could be used. Also, measurements should be made by a minimum of two independent people. These measurements should be compared and marked differences (eg > 1 mm; Cunnigham, 1986) resolved by a third measurement.

5. Suggestions for future research

The present study has provided some support for the prediction from evolutionary theory of a basic universal standard of attractiveness. However, this and previous cross-cultural research have only examined a limited number of cultures. All studies have included a Western culture for comparison and most other cultures used have probably been "Westernized" to an extent. Therefore, it could still be argued that these cultures' similarities in the perception of facial attractiveness were determined by their adopted Western values rather than their genes. In order to provide more conclusive evidence, subjects and stimulus faces from cultures which have had little or no contact with the Western world should be used in future research, using the methodology described in the previous section.

By showing that there was more intra-cultural agreement than cross-cultural agreement over facial attractiveness, the present study has also provided evidence that the standard of attractiveness is to a certain extent culture-specific. If an evolutionary framework is to be used, predictions of the shape of this culture-specific standard of facial attractiveness could be formulated by looking at the evolutionary history and environmental conditions which have shaped a certain culture.

For example, it may be that in a society where males and females traditionally have very seperate roles (eg the male as the provider and the female as the home maker and child-bearer), the features of male and female faces rated as very attractive are further towards the extremes of the maturity-babyishness scale than in a society where males and females have traditionally more equal status.

Since sociobiological theory states that female attractiveness is primarily an indicator of health and fertility, it may also be that subjects from a culture with

traditional shortages of food and nutrition find female faces with fuller, fatter faces more attractive than subjects from cultures where food shortage and malnutrition are not a problem. Male faces would then be rated similarly as a full face would indicate being well fed and therefore able to provide for the offspring.

Possible differences in perceptions of attractiveness within the same culture could also be investigated. For example, do homosexual men find male faces with more babyish features attractive and do homosexual women find female faces with more mature features more attractive than heterosexual men and women?

Comparisons of attractiveness ratings from subjects of different age groups may be interesting as well. For example, whilst college aged New Zealand women were found by this study to rate male faces with higher eyebrows as more attractive, this may not be the case for older New Zealand women whose criteria for attractiveness may have been determined by more traditional values.

Another finding from the present study which deserves more attention is whether caucasian faces are seen as most attractive by all other cultures, or just by cultures which have been influenced by the Western media.

The intriguing finding that Japanese males rated New Zealand males significantly more attractive than the other subjects should be replicated before conclusions are drawn about it.

6. Conclusion

> "Except for some arbitrary beauty contest conventions about 'ideal' female dimensions, we know less about attractive stimuli for man than we do about those of fish." (Hochberg, 1964; in Berscheid and Walster, 1974; p 177).

Subsequent research has now provided us with some answers to the question of what is attractive. The current study has provided some evidence for an evolutionary determined cross-cultural standard of attractiveness. For female faces, the eyes and the mouth appear to be important determinants of attractiveness for subjects from both Japan and New Zealand, whilst other features were only found to be important for one culture. The study failed to identify cross-culturally attractive male features, but high cross-cultural correlations between attractiveness ratings show that there must be something about a male face that subjects from both

cultures find attractive. Hopefully, future research will identify universally attractive features and culturally specific attractive features more clearly and provide explanations for cross-cultural differences in the perception of facial attractiveness.

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Appendix A

- English and Japanese versions of the instructions for the Japanese subjects
- English And Japanese versions of the answer sheet for the Japanese subjects

A study into the perception of facial beauty

INSTRUCTIONS

In this booklet you will find a total of 80 faces. You are requested to indicate how beautiful (or good-looking or physically attractive) you consider each face to be. In doing so, use your own personal standard of beauty. Don't be influenced by racial or ethnic factors, or whether you would want to go out with the person.

Below each face there is a rating scale ranging from 1 to 9. The meanings of the numbers are as follows:

9 = Extremely attractive
8 = Very attractive
7 = Moderately attractive
6 = Slightly attractive
5 = Neither attractive nor unattractive
4 = Slightly unattractive
3 = Moderately unattractive
2 = Very unattractive
1 = Extremely unattractive

a) On the answer sheet provided, please enter your ratings for each face by circling the appropriate numbers. Please make sure that each rating corresponds to the right face number. Don't get out of sequence.

b) Please write this code number on your answer sheet:

c) Please indicate your sex and age on the answer sheet.

THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION.

「顔」における人間の美感

この冊子には８０の顔の写真が載っています。これを一つ一つ見て、それぞれの顔の「美しさ」（きれいであるか、あまりきれいでないかなど）を決めて、記入して下さい。あなたご自身の「美しさ」の水準ですから、人種的、文化的な要因や、個人としてもし機会があればこの人と付き合うか付き合わないかのようなことに左右されないで下さい。

各顔の下に、１から９までのスケールがあり、それぞれの意味は下記の通りです。

9　非常に美しい／魅力的
8　とても美しい／顔立ちの良い
7　美しい
6　ややきれい
5　どちらとも言えない
4　ややきれい
3　美しくない
2　まったく美しくない
1　非常に醜い

）アンケートに、各顔については番号に丸を付けて下さい。顔の番号をよく見て記入してください。

）年令と性別を記入して下さい。

）コード番号を必ず書いて下さい。

ご協力ありがとうございます。

ANSWER SHEET

BOOKLET CODE NUMBER = ...

YOUR SEX: MALE ( )
FEMALE ( )

YOUR AGE? AGE = ... YEARS

Please enter your attractiveness ratings next to each face number by circling the appropriate numbers.

	RATING										RATING									
	Extremely unattractive									Extremely attractive	Extremely unattractive									Extremely attractive
	|									|	|									|
FACE NO	1	1	2	3	4	5	6	7	8	9	FACE NO	21	1	2	3	4	5	6	7	8	9
	2	1	2	3	4	5	6	7	8	9		22	1	2	3	4	5	6	7	8	9
	3	1	2	3	4	5	6	7	8	9		23	1	2	3	4	5	6	7	8	9
	4	1	2	3	4	5	6	7	8	9		24	1	2	3	4	5	6	7	8	9
	5	1	2	3	4	5	6	7	8	9		25	1	2	3	4	5	6	7	8	9
	6	1	2	3	4	5	6	7	8	9		26	1	2	3	4	5	6	7	8	9
	7	1	2	3	4	5	6	7	8	9		27	1	2	3	4	5	6	7	8	9
	8	1	2	3	4	5	6	7	8	9		28	1	2	3	4	5	6	7	8	9
	9	1	2	3	4	5	6	7	8	9		29	1	2	3	4	5	6	7	8	9
	10	1	2	3	4	5	6	7	8	9		30	1	2	3	4	5	6	7	8	9
	11	1	2	3	4	5	6	7	8	9		31	1	2	3	4	5	6	7	8	9
	12	1	2	3	4	5	6	7	8	9		32	1	2	3	4	5	6	7	8	9
	13	1	2	3	4	5	6	7	8	9		33	1	2	3	4	5	6	7	8	9
	14	1	2	3	4	5	6	7	8	9		34	1	2	3	4	5	6	7	8	9
	15	1	2	3	4	5	6	7	8	9		35	1	2	3	4	5	6	7	8	9
	16	1	2	3	4	5	6	7	8	9		36	1	2	3	4	5	6	7	8	9
	17	1	2	3	4	5	6	7	8	9		37	1	2	3	4	5	6	7	8	9
	18	1	2	3	4	5	6	7	8	9		38	1	2	3	4	5	6	7	8	9
	19	1	2	3	4	5	6	7	8	9		39	1	2	3	4	5	6	7	8	9
	20	1	2	3	4	5	6	7	8	9		40	1	2	3	4	5	6	7	8	9

Please Turn Over

		RATING											RATING									
		Extremely unattractive									Extremely attractive		Extremely unattractive									Extremely attractive
		|									|	|									|
FACE NO	41	1	2	3	4	5	6	7	8	9		FACE NO	61	1	2	3	4	5	6	7	8	9
	42	1	2	3	4	5	6	7	8	9			62	1	2	3	4	5	6	7	8	9
	43	1	2	3	4	5	6	7	8	9			63	1	2	3	4	5	6	7	8	9
	44	1	2	3	4	5	6	7	8	9			64	1	2	3	4	5	6	7	8	9
	45	1	2	3	4	5	6	7	8	9			65	1	2	3	4	5	6	7	8	9
	46	1	2	3	4	5	6	7	8	9			66	1	2	3	4	5	6	7	8	9
	47	1	2	3	4	5	6	7	8	9			67	1	2	3	4	5	6	7	8	9
	48	1	2	3	4	5	6	7	8	9			68	1	2	3	4	5	6	7	8	9
	49	1	2	3	4	5	6	7	8	9			69	1	2	3	4	5	6	7	8	9
	50	1	2	3	4	5	6	7	8	9			70	1	2	3	4	5	6	7	8	9
	51	1	2	3	4	5	6	7	8	9			71	1	2	3	4	5	6	7	8	9
	52	1	2	3	4	5	6	7	8	9			72	1	2	3	4	5	6	7	8	9
	53	1	2	3	4	5	6	7	8	9			73	1	2	3	4	5	6	7	8	9
	54	1	2	3	4	5	6	7	8	9			74	1	2	3	4	5	6	7	8	9
	55	1	2	3	4	5	6	7	8	9			75	1	2	3	4	5	6	7	8	9
	56	1	2	3	4	5	6	7	8	9			76	1	2	3	4	5	6	7	8	9
	57	1	2	3	4	5	6	7	8	9			77	1	2	3	4	5	6	7	8	9
	58	1	2	3	4	5	6	7	8	9			78	1	2	3	4	5	6	7	8	9
	59	1	2	3	4	5	6	7	8	9			79	1	2	3	4	5	6	7	8	9
	60	1	2	3	4	5	6	7	8	9			80	1	2	3	4	5	6	7	8	9

答用紙

ンケート　コード番号＝.....

別：　男（　）
　　女（　）

合：　.....才

顔の番号の横にあるスケールから番号を選び、丸を付けて下さい。

顔の番号	スケール（非常に醜い ｜ 非常に美しい）	顔の番号	スケール（非常に醜い ｜ 非常に美しい）
1	1 2 3 4 5 6 7 8 9	21	1 2 3 4 5 6 7 8 9
2	1 2 3 4 5 6 7 8 9	22	1 2 3 4 5 6 7 8 9
3	1 2 3 4 5 6 7 8 9	23	1 2 3 4 5 6 7 8 9
4	1 2 3 4 5 6 7 8 9	24	1 2 3 4 5 6 7 8 9
5	1 2 3 4 5 6 7 8 9	25	1 2 3 4 5 6 7 8 9
6	1 2 3 4 5 6 7 8 9	26	1 2 3 4 5 6 7 8 9
7	1 2 3 4 5 6 7 8 9	27	1 2 3 4 5 6 7 8 9
8	1 2 3 4 5 6 7 8 9	28	1 2 3 4 5 6 7 8 9
9	1 2 3 4 5 6 7 8 9	29	1 2 3 4 5 6 7 8 9
10	1 2 3 4 5 6 7 8 9	30	1 2 3 4 5 6 7 8 9
11	1 2 3 4 5 6 7 8 9	31	1 2 3 4 5 6 7 8 9
12	1 2 3 4 5 6 7 8 9	32	1 2 3 4 5 6 7 8 9
13	1 2 3 4 5 6 7 8 9	33	1 2 3 4 5 6 7 8 9
14	1 2 3 4 5 6 7 8 9	34	1 2 3 4 5 6 7 8 9
15	1 2 3 4 5 6 7 8 9	35	1 2 3 4 5 6 7 8 9
16	1 2 3 4 5 6 7 8 9	36	1 2 3 4 5 6 7 8 9
17	1 2 3 4 5 6 7 8 9	37	1 2 3 4 5 6 7 8 9
18	1 2 3 4 5 6 7 8 9	38	1 2 3 4 5 6 7 8 9
19	1 2 3 4 5 6 7 8 9	39	1 2 3 4 5 6 7 8 9
20	1 2 3 4 5 6 7 8 9	40	1 2 3 4 5 6 7 8 9

Please Turn Over

	スケール									
	非常に醜い									非常に美しい
の番号	41	1	2	3	4	5	6	7	8	9
	42	1	2	3	4	5	6	7	8	9
	43	1	2	3	4	5	6	7	8	9
	44	1	2	3	4	5	6	7	8	9
	45	1	2	3	4	5	6	7	8	9
	46	1	2	3	4	5	6	7	8	9
	47	1	2	3	4	5	6	7	8	9
	48	1	2	3	4	5	6	7	8	9
	49	1	2	3	4	5	6	7	8	9
	50	1	2	3	4	5	6	7	8	9
	51	1	2	3	4	5	6	7	8	9
	52	1	2	3	4	5	6	7	8	9
	53	1	2	3	4	5	6	7	8	9
	54	1	2	3	4	5	6	7	8	9
	55	1	2	3	4	5	6	7	8	9
	56	1	2	3	4	5	6	7	8	9
	57	1	2	3	4	5	6	7	8	9
	58	1	2	3	4	5	6	7	8	9
	59	1	2	3	4	5	6	7	8	9
	60	1	2	3	4	5	6	7	8	9

	スケール									
	非常に醜い									非常に美しい
顔の番号	61	1	2	3	4	5	6	7	8	9
	62	1	2	3	4	5	6	7	8	9
	63	1	2	3	4	5	6	7	8	9
	64	1	2	3	4	5	6	7	8	9
	65	1	2	3	4	5	6	7	8	9
	66	1	2	3	4	5	6	7	8	9
	67	1	2	3	4	5	6	7	8	9
	68	1	2	3	4	5	6	7	8	9
	69	1	2	3	4	5	6	7	8	9
	70	1	2	3	4	5	6	7	8	9
	71	1	2	3	4	5	6	7	8	9
	72	1	2	3	4	5	6	7	8	9
	73	1	2	3	4	5	6	7	8	9
	74	1	2	3	4	5	6	7	8	9
	75	1	2	3	4	5	6	7	8	9
	76	1	2	3	4	5	6	7	8	9
	77	1	2	3	4	5	6	7	8	9
	78	1	2	3	4	5	6	7	8	9
	79	1	2	3	4	5	6	7	8	9
	80	1	2	3	4	5	6	7	8	9

Appendix B

- First five pages of a sample booklet for New Zealand subjects
- First five pages of a sample booklet for Japanese subjects

A study into the perception of facial beauty

INSTRUCTIONS

1) Some Personal Details:

You are: (Tick one) MALE ( )
FEMALE ( )

How old are you? AGE = ... years

2) In this booklet you will find a total of 80 faces. You are requested to indicate how beautiful (or good-looking or physically attractive) you consider each face to be. In doing so, use your own personal standard of beauty. Don't be influenced by racial or ethnic factors, or whether you would want to go out with the person.

Below each face there is a rating scale ranging from 1 to 9. The meanings of the numbers are as follows:

9 = Extremely attractive
8 = Very attractive
7 = Moderately attractive
6 = Slightly attractive
5 = Neither attractive nor unattractive
4 = Slightly unattractive
3 = Moderately unattractive
2 = Very unattractive
1 = Extremely unattractive

On each scale, please circle the number which you think best represents the face above it.

THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION.

9 Extremely Attractive

8 Very Attractive

7 Moderately Attractive

6 Slightly Attractive

5 Neither attractive nor unattractive

4 Slightly Unattractive

3 Moderately Unattractive

2 Very Unattractive

1 Extremely Unattractive

9 Extremely Attractive

8 Very Attractive

7 Moderately Attractive

6 Slightly Attractive

5 Neither attractive nor unattractive

4 Slightly Unattractive

3 Moderately Unattractive

2 Very Unattractive

1 Extremely Unattractive

9 Extremely Attractive

8 Very Attractive

7 Moderately Attractive

6 Slightly Attractive

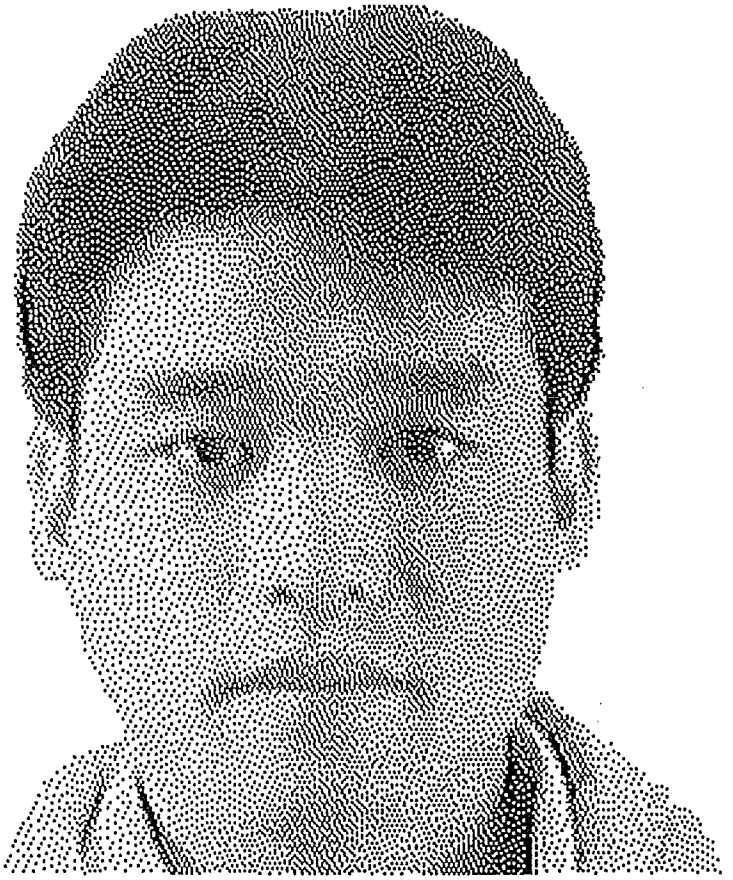
5 Neither attractive nor unattractive

4 Slightly Unattractive

3 Moderately Unattractive

2 Very Unattractive

1 Extremely Unattractive



9 Extremely Attractive

8 Very Attractive

7 Moderately Attractive

6 Slightly Attractive

5 Neither attractive nor unattractive

4 Slightly Unattractive

3 Moderately Unattractive

2 Very Unattractive

1 Extremely Unattractive

「顔」における人間の美感

この冊子には８０の顔の写真が載っています。これを一つ一つ見て、それぞれの顔の美しさ」（きれいであるか、あまりきれいでないかなど）を決めて、記入して下さい。なたご自身の「美しさ」の水準ですから、人種的、文化的な要因や、個人としてもし機があればこの人と付き合うか付き合わないかのようなことに左右されないで下さい。

各顔の下に、１から９までのスケールがあり、それぞれの意味は下記の通りです。

非常に美しい／魅力的
とても美しい／顔立ちの良い
美しい
ややきれい
どちらとも言えない
ややきれい
美しくない
まったく美しくない
非常に醜い

）アンケートに、各顔については番号に丸を付けて下さい。顔の番号をよく見て記入しください。

）年令と性別を記入して下さい。

）コード番号を必ず書いて下さい。

ご協力ありがとうございます。

9　ものすごく良い顔付

8　大いにきれい／顔付の良い

7　きれい／格好良い

6　ややきれい／格好良い

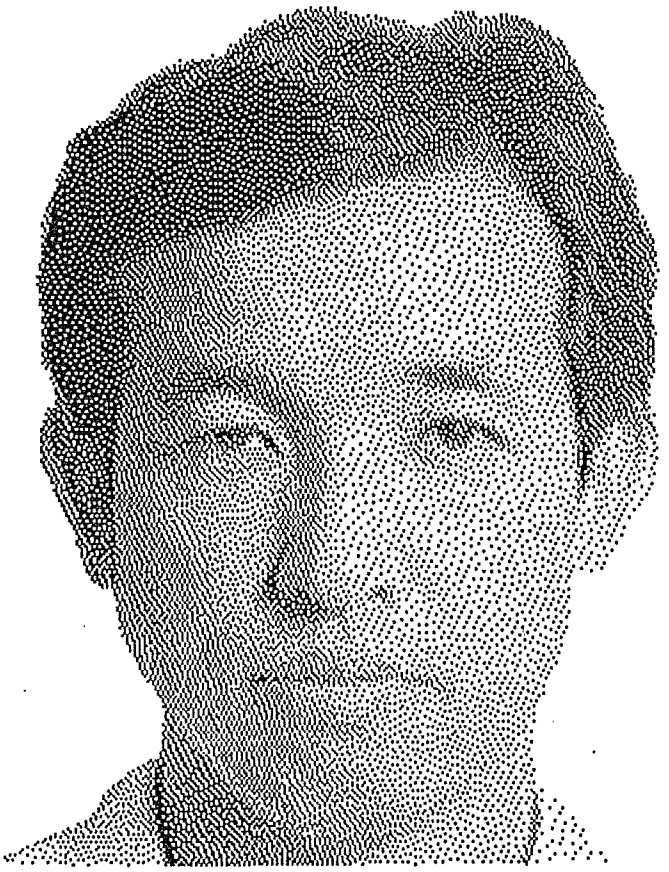
5　どちらとも言えない

4　やや格好良くない

3　美しくない／ハンサムではない顔

2　ものすごく醜い

1　全く格好良くない



9　ものすごく良い顔付

8　大いにきれい／顔付の良い

7　きれい／格好良い

6　ややきれい／格好良い

5　どちらとも言えない

4　やや格好良くない

3　美しくない／ハンサムではない顔

2　ものすごく醜い

1　全く格好良くない

9　ものすごく良い顔付

8　大いにきれい／顔付の良い

7　きれい／格好良い

6　ややきれい／格好良い

5　どちらとも言えない

4　やや格好良くない

3　美しくない／ハンサムではない顔

2　ものすごく醜い

1　全く格好良くない

9　ものすごく良い顔付

8　大いにきれい／顔付の良い

7　きれい／格好良い

6　ややきれい／格好良い

5　どちらとも言えない

4　やや格好良くない

3　美しくない／ハンサムではない顔

2　ものすごく醜い

1　全く格好良くない

Appendix C

- English version of the letter sent to Professor Oba in Japan
- Japanese version of the letter sent to Professor Oba in Japan

16 October 1989

Mr Jim Pollard
Department of Psychology
University of Canterbury
Private Bag
Christchurch
New Zealand

Professor Shigeru OBA, PhD
Professor of Social Psychology
Department of Psychology
Okayama University
Tsushima
Okayama 700
Japan

Dear Professor Shigeru,

Thank you very much for helping us with this research project. Could you please do the following:

1. Hand out the booklets and answer sheets to 50 male and 50 female students, preferably aged between 17 and 23.
2. Tell them to make sure that they enter their **sex, age** and **booklet code number** on their answer sheets.
3. Tell them to make sure that each attractiveness rating is for the right face number, so that they don't get out of sequence. The whole exercise will take about 15 minutes.
4. Then collect all the answer sheets. The students can keep the booklets if they wish.
5. Could you please send the answer sheets back **collect** by **courier.**

Yours sincerely,

Jim Pollard.

16 October 1989

Mr Jim Pollard
Department of Psychology
University of Canterbury
Private Bag
Christchurch
New Zealand

Professor Shigeru OBA, PhD
Professor of Social Psychology
Department of Psychology
Okayama University
Tsushima
Okayama 700
Japan

ノゲル博士殿

主啓

の度、研究にご協力頂いて、誠にありがとうございます。おそれ入りますが、次ぎのこを行って頂けますか。

１．アンケートと回答用紙を男の学生５０人、女の学生５０人に渡して下さい。できたら１７才～２３才の人が最適です。
２．必ず性別、年令とコード番号を回答用紙に書いてもらって下さい。
３．顔の番号と、丸を付けたスケールの番号があっているように回答者に注意してもらって下さい。所要時間は約１５分です。
４．回答用紙を集めて下さい。冊子は学生がもって帰ってもかまいません。
５．回答用紙を宅急便でご返却お願い致します。コレックトにして頂ければ、こちらで支払い致します。

具

ム・ポラード

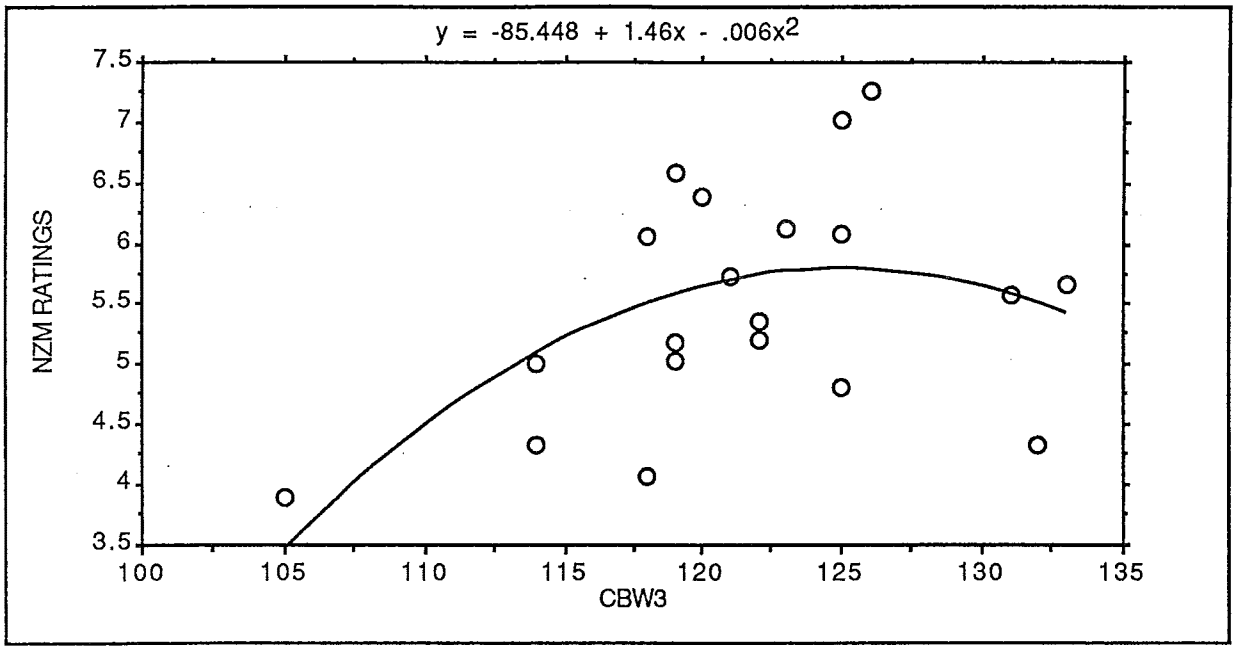
Jim Pollard.

Appendix D

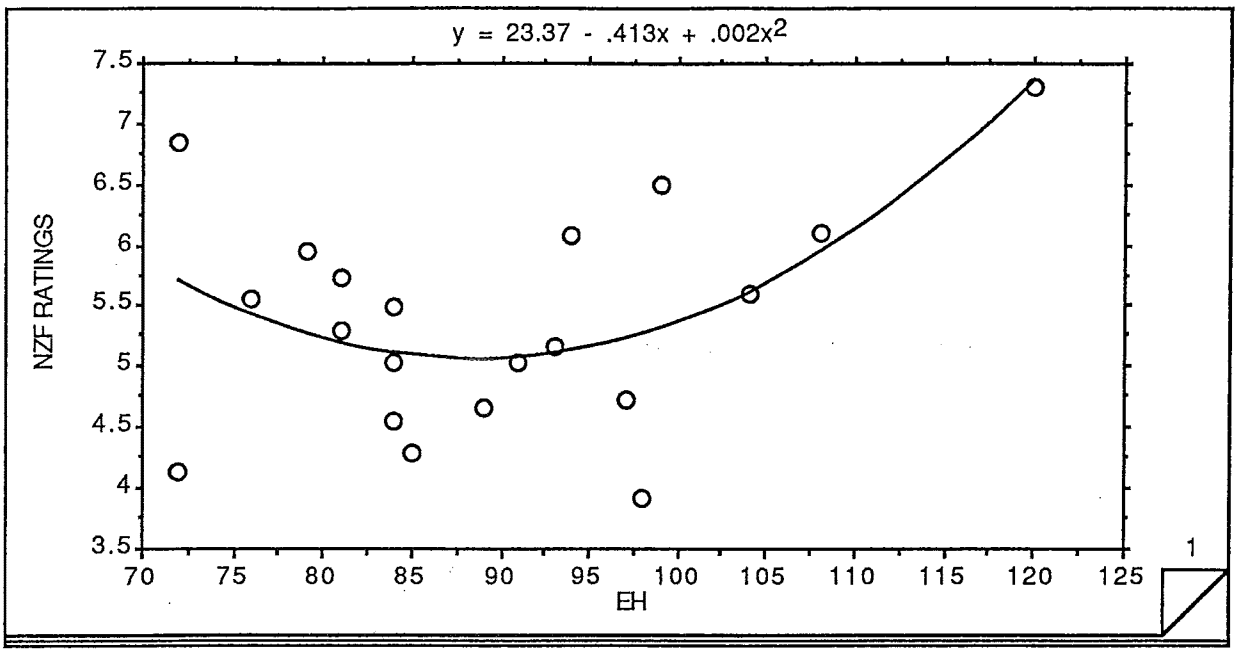
- Scattergrams of significant curvilinear correlations between attractiveness ratings and feature measurements of the four stimulus groups.

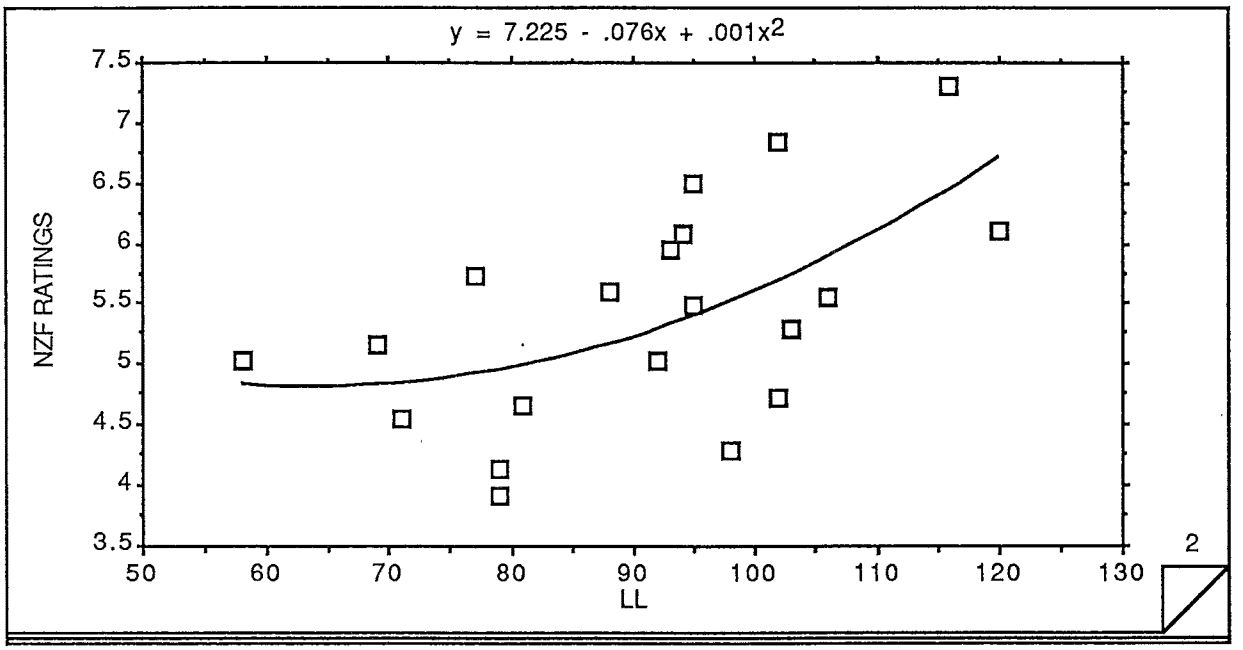
Please note that where significant curvilinear correlations were found for both genders from one culture for a particular feature measurement, only the scattergram for one of these genders is given since the correlations were almost identical.

Curvilinear correlation between NZ male ratings and NZ female features

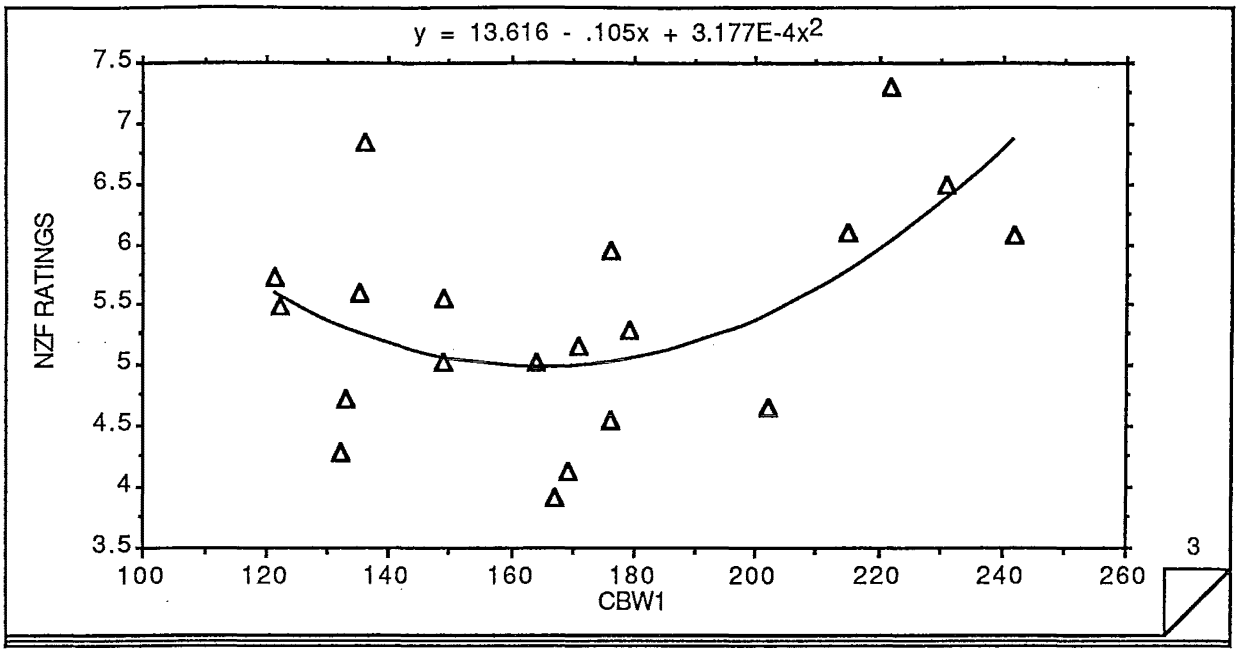


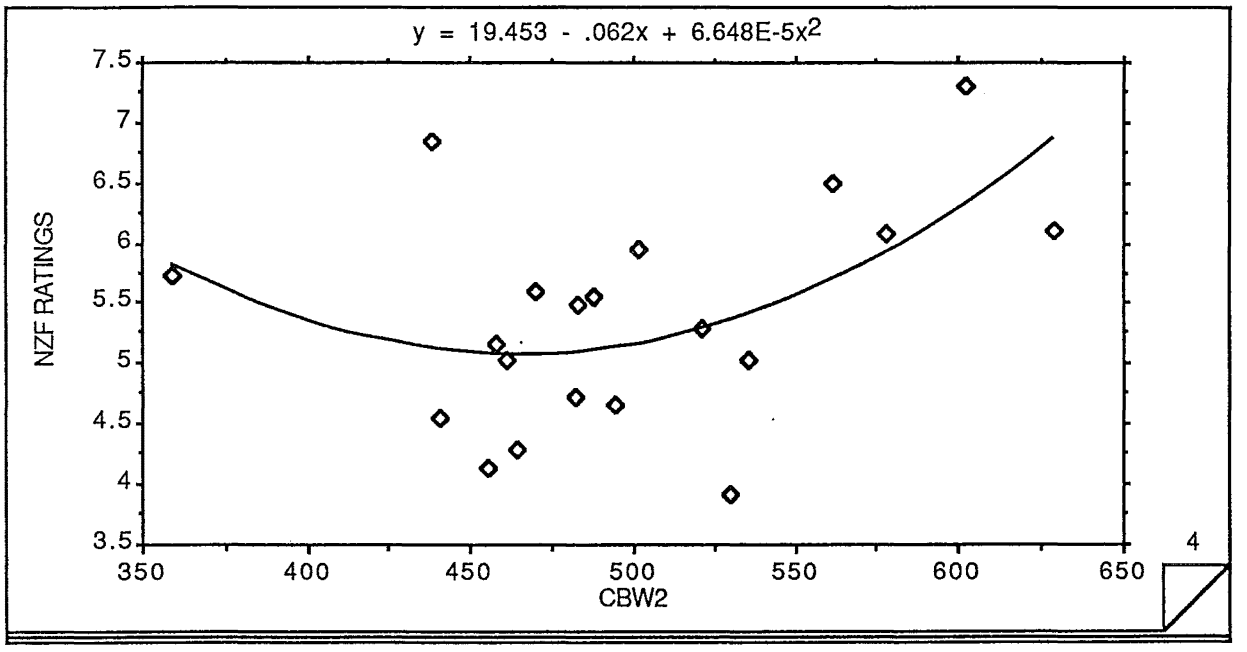
Curvilinear correlations between NZ female ratings and NZ female features



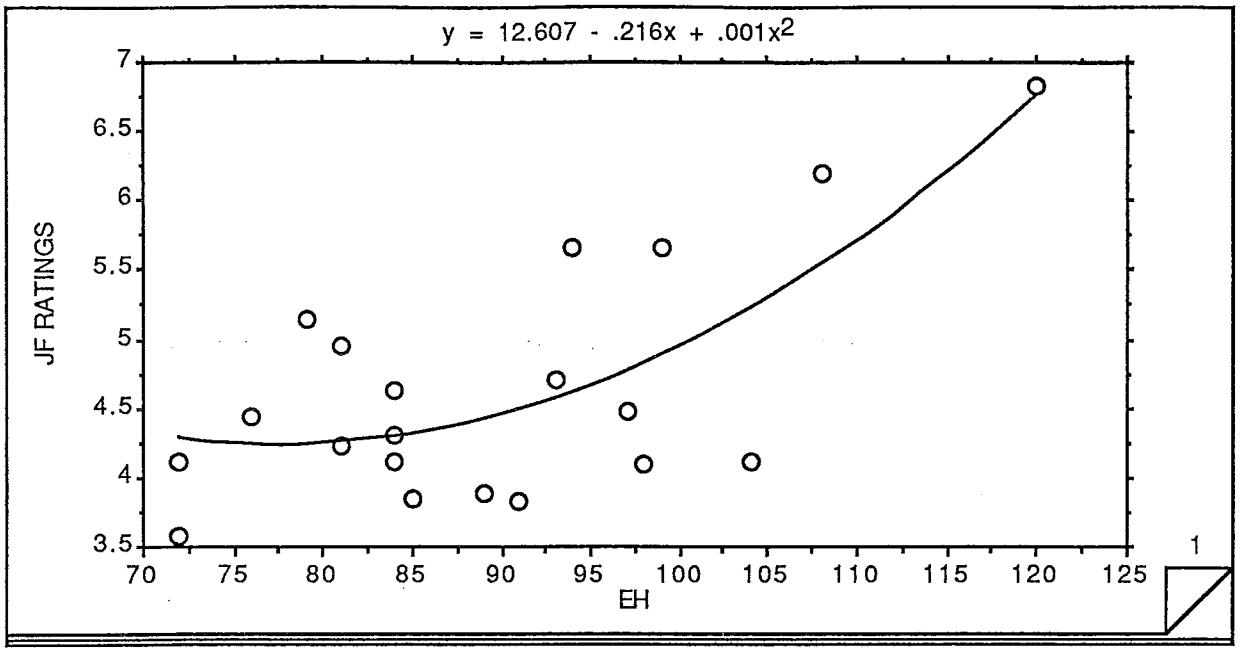


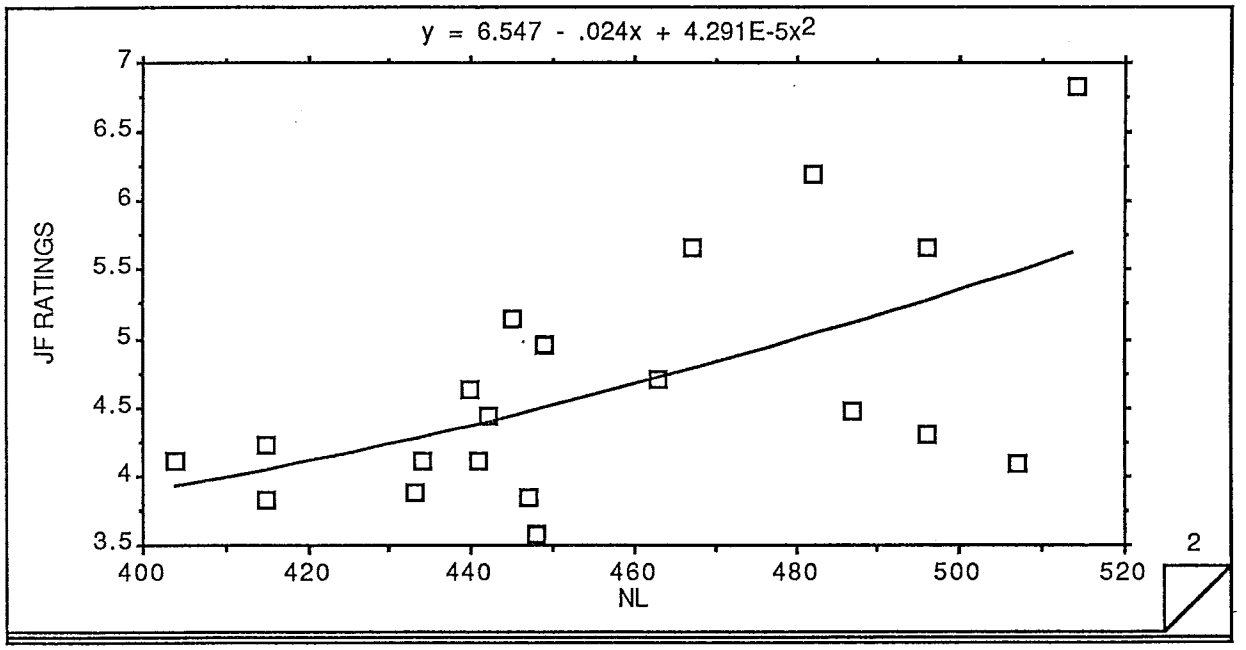
Curvilinear correlations between NZ female ratings and NZ female features



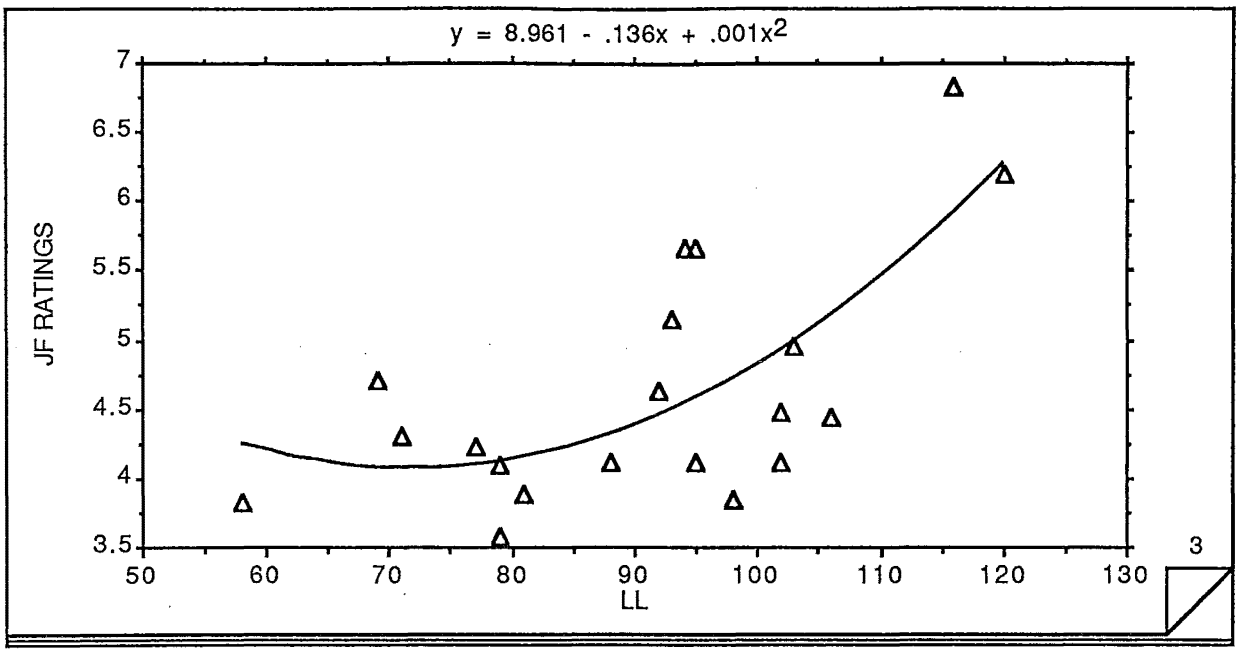


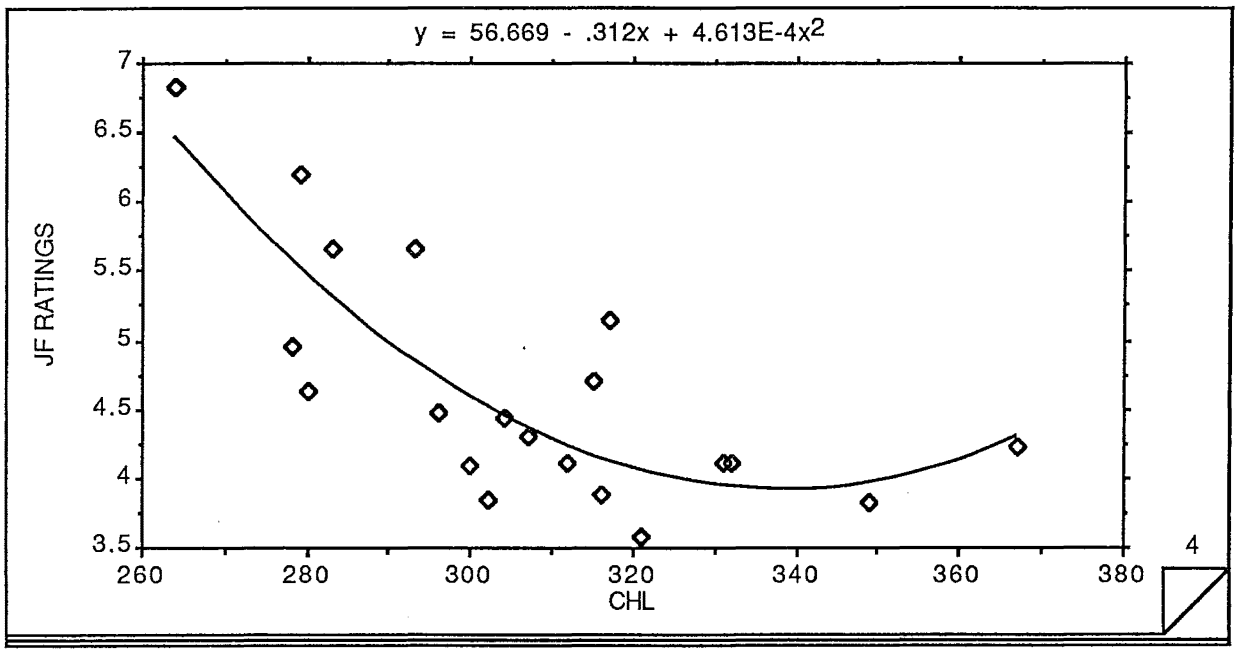
Curvilinear correlations between Jap female ratings and NZ female features



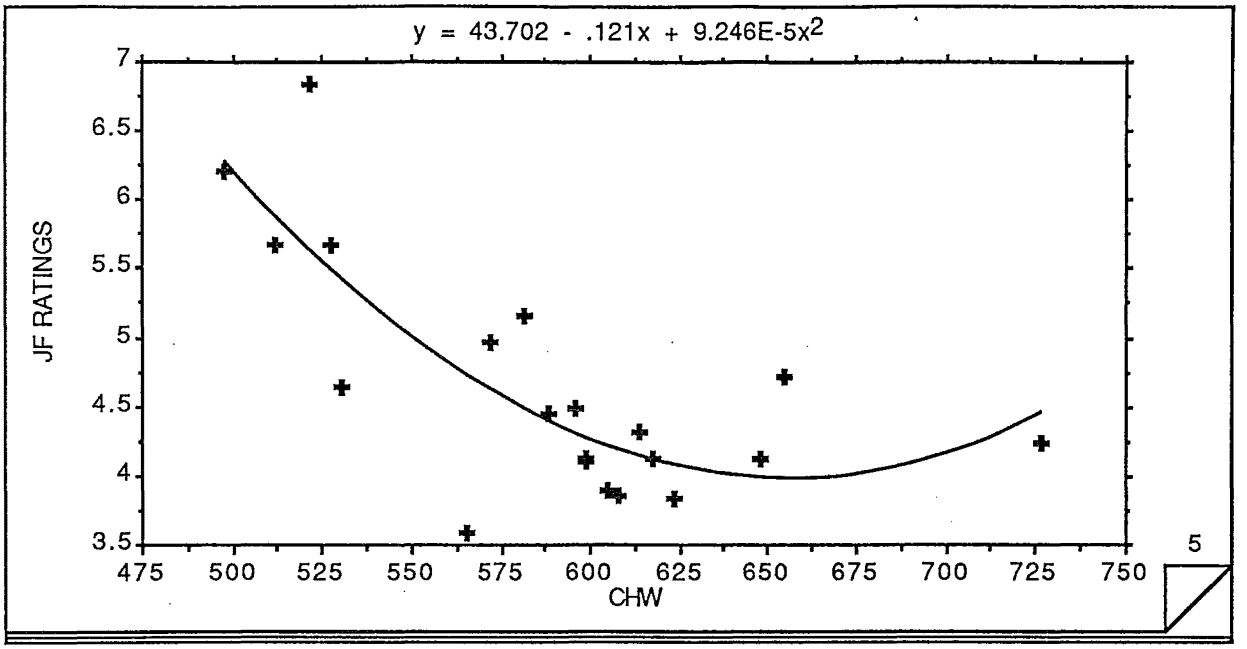


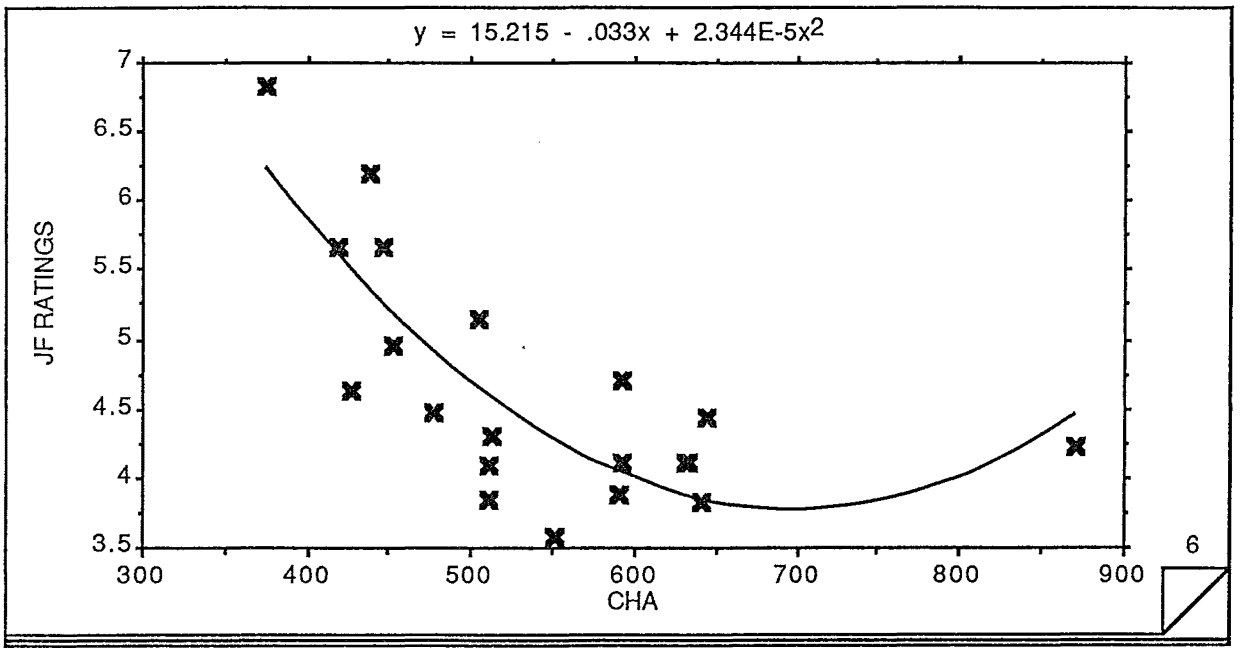
Curvilinear correlations between Jap female ratings and NZ female features



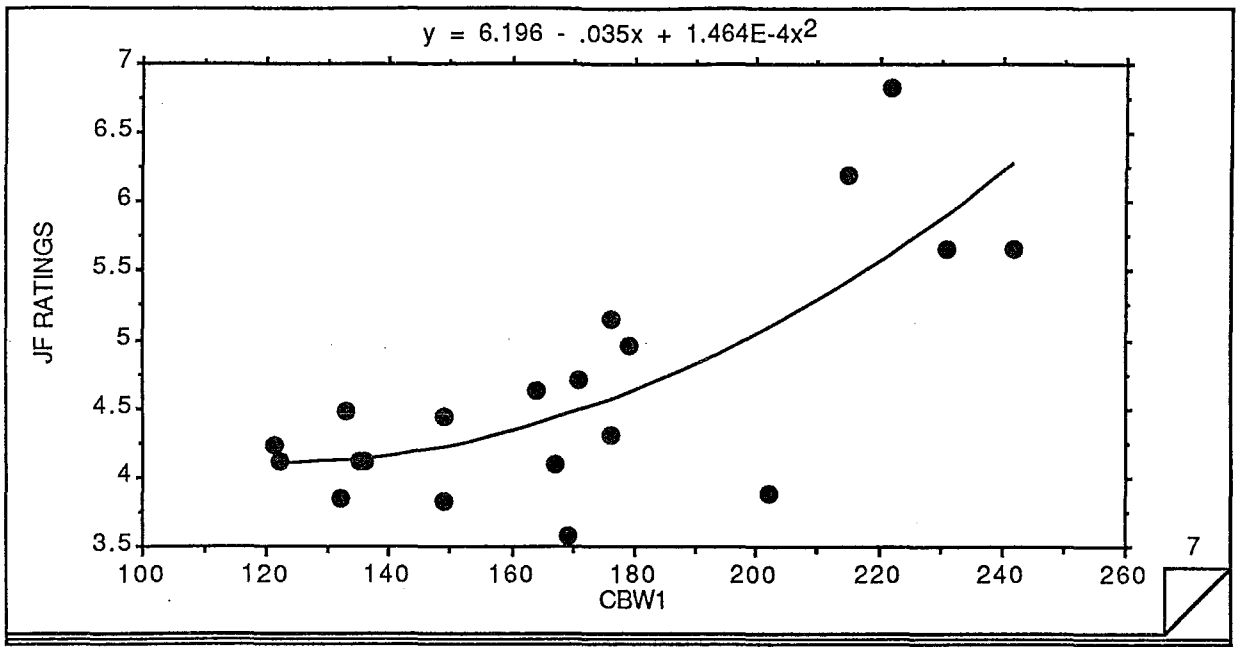


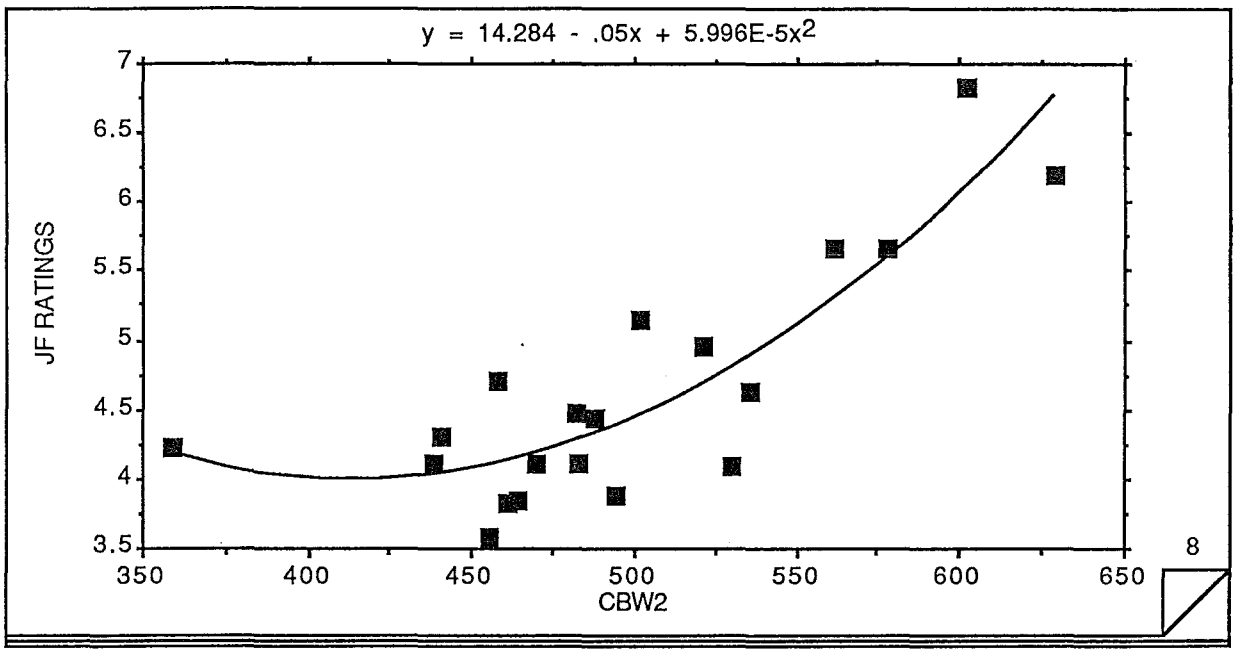
Curvilinear correlations between Jap female ratings and NZ female features



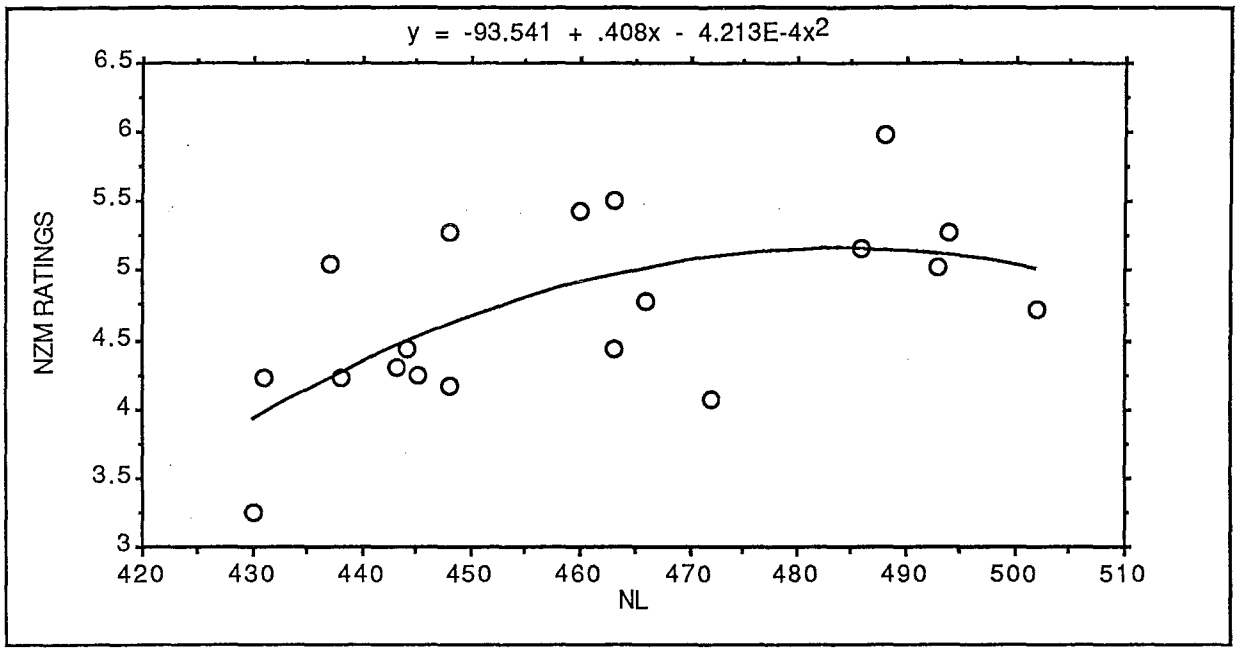


Curvilinear correlations between Jap female ratings and NZ female features

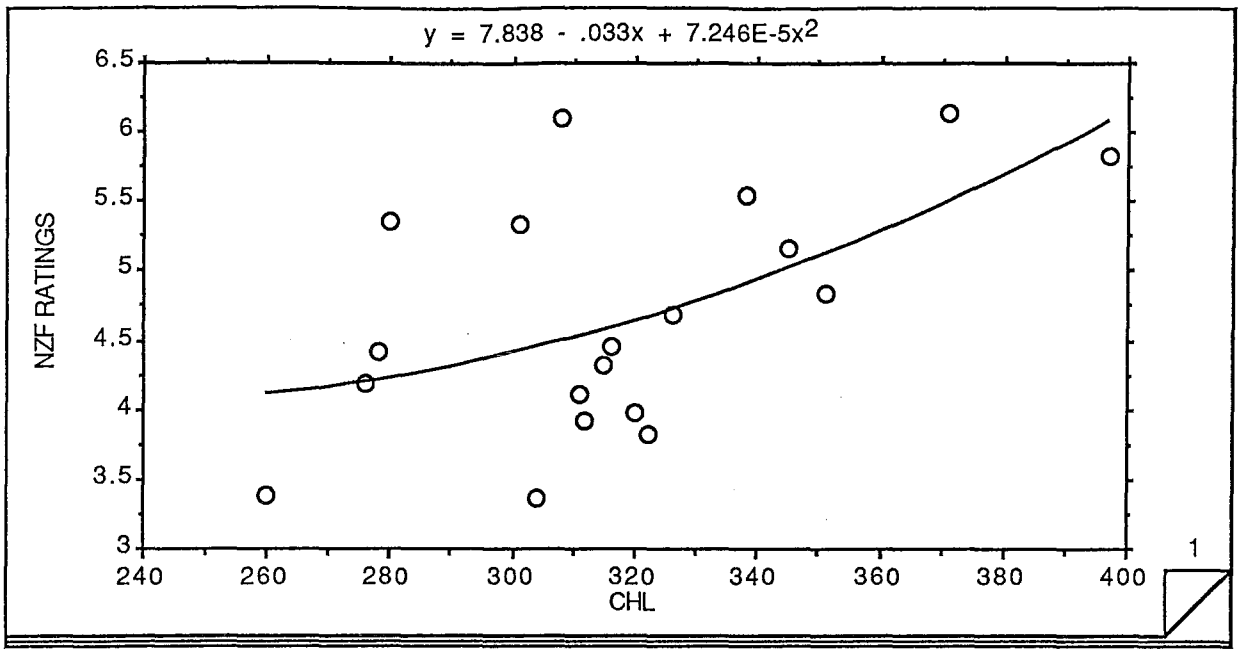


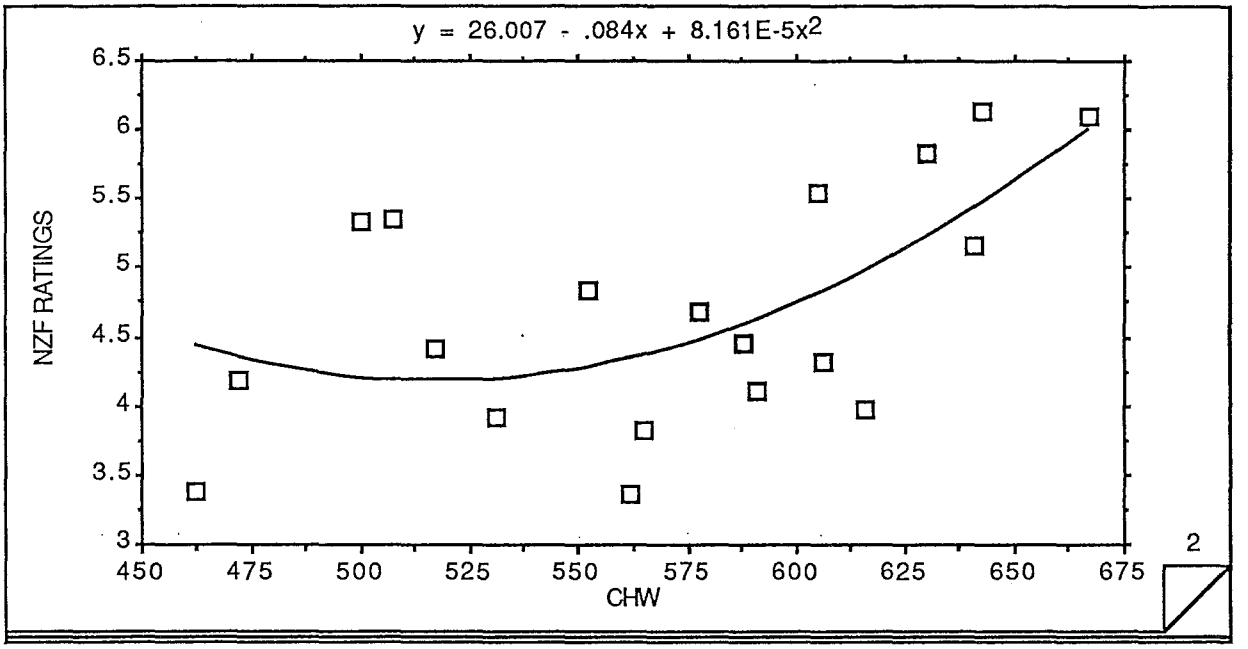


Curvilinear correlation between NZ male ratings and Jap female features

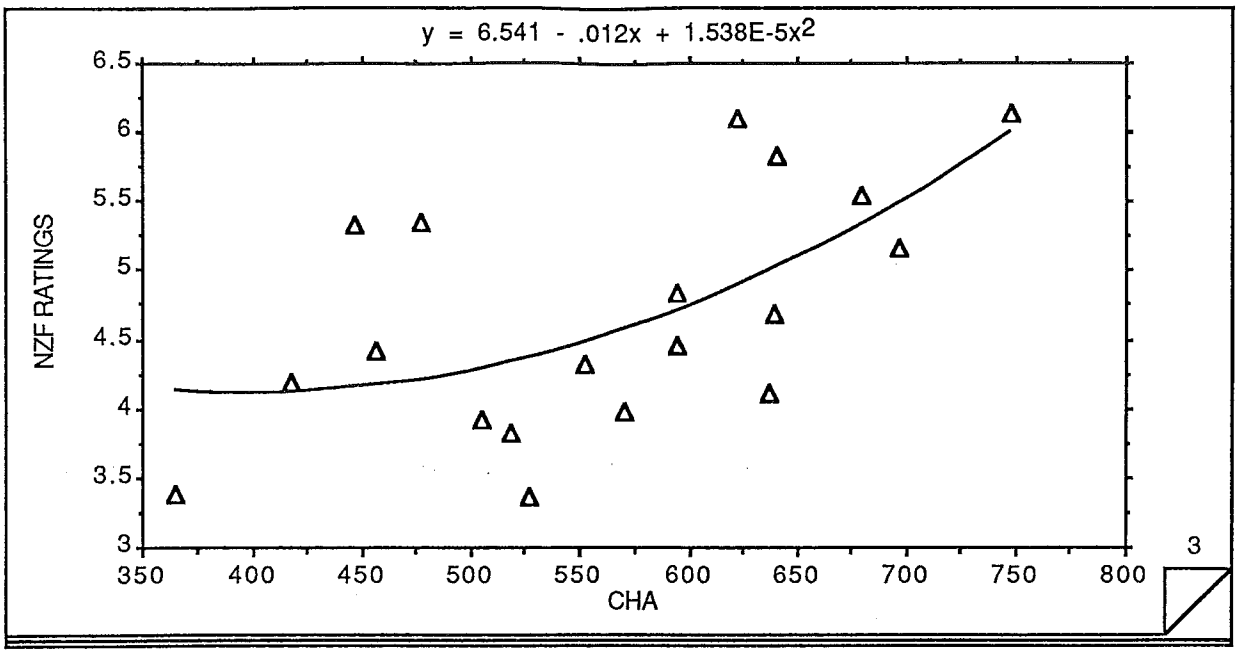


Curvilinear correlations between NZ female ratings and NZ male features

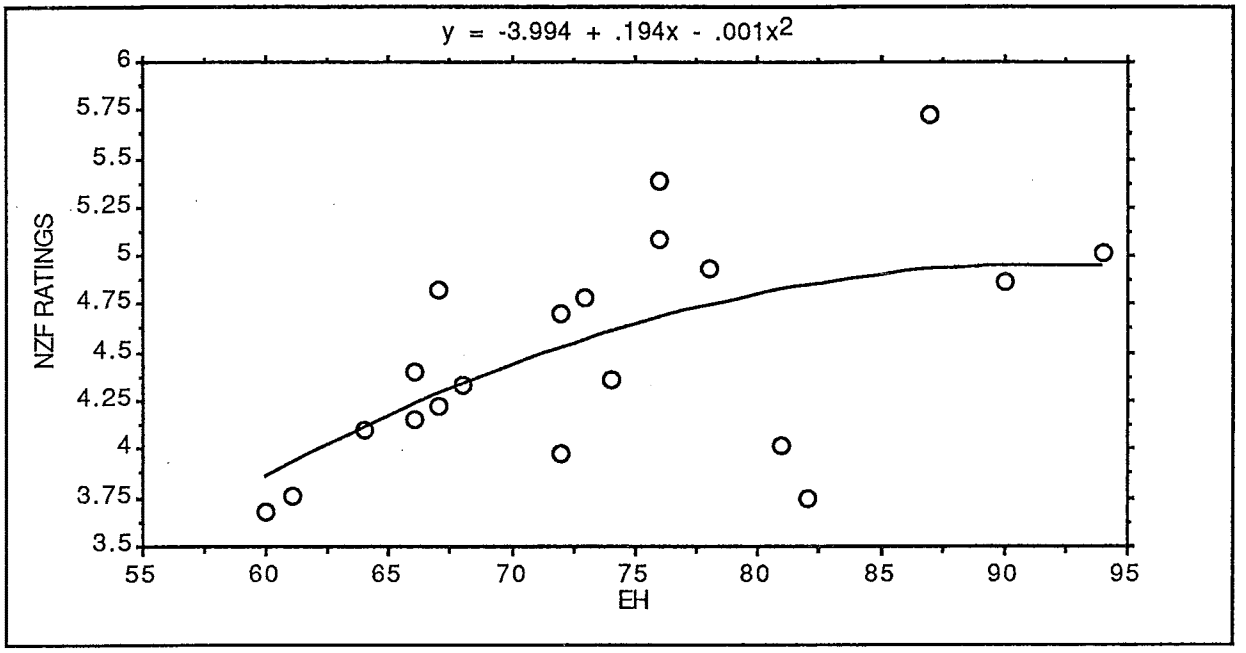




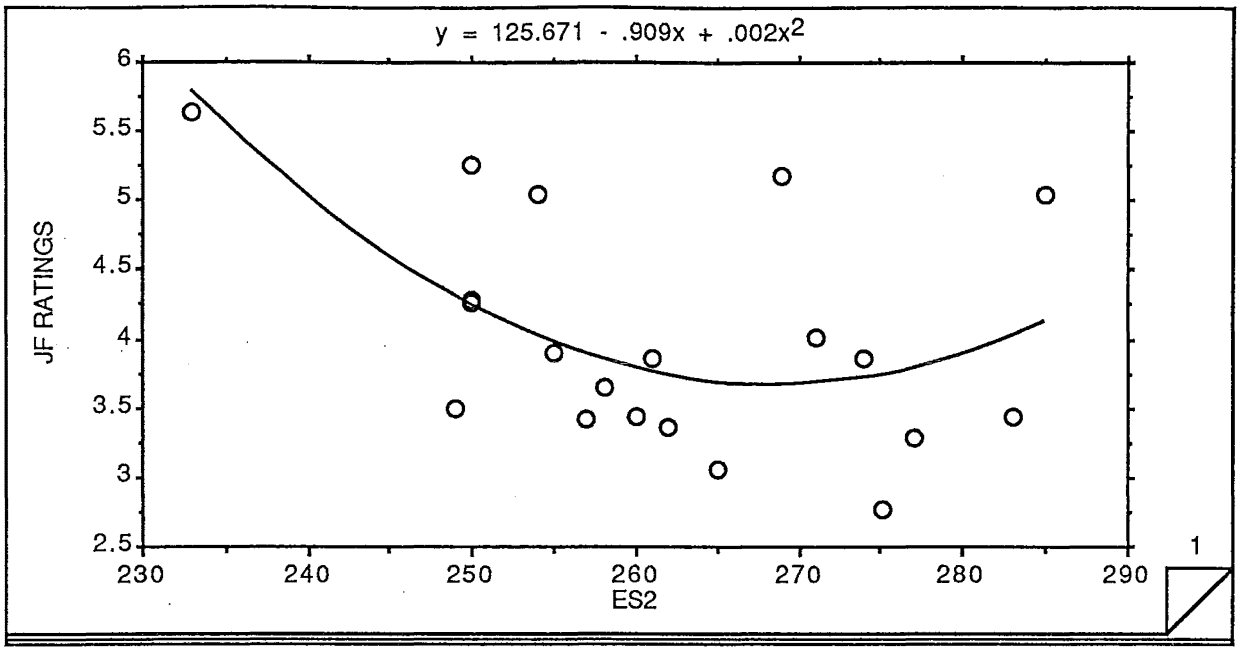
Curvilinear correlations between NZ female ratings and NZ male features

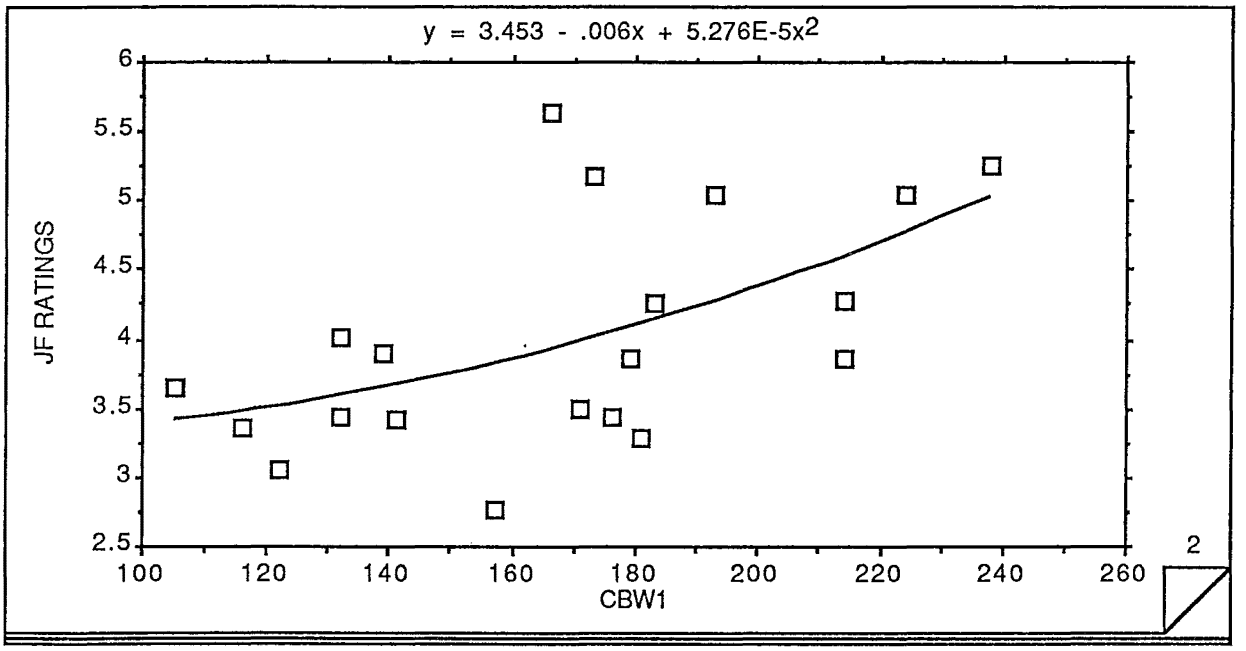


Curvilinear correlation between NZ female ratings and Jap male features



Curvilinear correlations between Jap female ratings and Jap male features





Appendix E

- Calculations of regression analyses for each of the four stimulus groups, using the variables which were significantly correlated with attractiveness ratings.

Simple regression analysis between NZ male ratings and NZ female features

Simple Regression X_1: qCBW3NZM Y_1: NZM RATINGS

DF:	R:	R-squared:	Adj. R-squared:	Std. Error:
19	.548	.301	.262	.813

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	5.121	5.121	7.739
RESIDUAL	18	11.91	.662	p = .0123
TOTAL	19	17.031		

No Residual Statistics Computed

1

Simple Regression X_1: qCBW3NZM Y_1: NZM RATINGS

Beta Coefficient Table

Parameter:	Value:	Std. Err.:	Std. Value:	t-Value:	Probability:
INTERCEPT	-2.745E-16				
SLOPE	1	.359	.548	2.782	.0123

Confidence Intervals Table

Parameter:	95% Lower:	95% Upper:	90% Lower:	90% Upper:
MEAN (X,Y)	5.102	5.866	5.169	5.799
SLOPE	.245	1.755	.377	1.623

2

Stepwise regression analysis between NZ female ratings and NZ female features

Stepwise Regression Y_1:NZF RATINGS 5 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	2
Variables Entered	2
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:NZF RATINGS 5 X variables

STEP NO. 1 VARIABLE ENTERED: X_2: qEHNZF

R:	R-squared:	Adj. R-squared:	Std. Error:
.584	.341	.305	.751

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	5.252	5.252	9.319
RESIDUAL	18	10.145	.564	
TOTAL	19	15.397		

2

STEP NO. 1 Stepwise Regression Y_1:NZF RATINGS 5 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	7.806E-18			
qEHNZF	1	.328	.584	9.319

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
LL	.332	2.104
qLLNZF	.323	1.977
qCBW1NZF	.544	7.13
qCBW2NZF	.329	2.059

3

Stepwise regression analysis between NZ female ratings and NZ female features

Stepwise Regression Y_1:NZF RATINGS 5 X variables

(Last Step) STEP NO. 2 VARIABLE ENTERED: X_4: qCBW1NZF

R:	R-squared:	Adj. R-squared:	Std. Error:
.732	.536	.481	.648

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	2	8.25	4.125	9.812
RESIDUAL	17	7.147	.42	
TOTAL	19	15.397		

4

STEP NO. 2 Stepwise Regression Y_1:NZF RATINGS 5 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-3.219			
qEHNZF	.803	.292	.469	7.539
qCBW1NZF	.794	.297	.456	7.13

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
LL	.222	.829
qLLNZF	.238	.96
qCBW2NZF	-.009	.001

5

Stepwise regression analysis between Jap male ratings and NZ female features

Stepwise Regression Y_1:JM RATINGS 16 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	2
Variables Entered	2
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:JM RATINGS 16 X variables

STEP NO. 1 VARIABLE ENTERED: X_{16}: qCBW2JM

R:	R-squared:	Adj. R-squared:	Std. Error:
.778	.606	.584	.443

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	5.416	5.416	27.635
RESIDUAL	18	3.527	.196	
TOTAL	19	8.943		

2

STEP NO. 1 Stepwise Regression Y_1:JM RATINGS 16 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-8.674E-19			
qCBW2JM	1	.19	.778	27.635

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
EH	.276	1.406
NL	.332	2.107
LL	.244	1.076
CHL	-.12	.25
CHW	.155	.42

3

Stepwise regression analysis between Jap male ratings and NZ female features

STEP NO. 1 Stepwise Regression Y_1:JM RATINGS 16 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CHA	-.129	.289
CBW1	.13	.292
CBW2	4.507E-19	3.452E-36
qEHJM	.456	4.464
qNLJM	.357	2.489
qLLJM	.318	1.911
qCHLJM	.166	.483

4

STEP NO. 1 Stepwise Regression Y_1:JM RATINGS 16 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
qCHWJM	-.26	1.231
qCHAJM	.205	.748
qCBW1JM	.142	.351

5

Stepwise Regression Y_1:JM RATINGS 16 X variables

(Last Step) STEP NO. 2 VARIABLE ENTERED: X_9: qEHJM

R:	R-squared:	Adj. R-squared:	Std. Error:
.829	.688	.651	.405

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	2	6.149	3.075	18.709
RESIDUAL	17	2.794	.164	
TOTAL	19	8.943		

6

Stepwise regression analysis between Jap male ratings and NZ female features

STEP NO. 2 Stepwise Regression Y_1:JM RATINGS 16 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-.838			
qEHJM	.534	.253	.4	4.464
qCBW2JM	.641	.243	.499	6.952

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
EH	-.131	.277
NL	.229	.885
LL	.244	1.016
CHL	-.181	.545

7

STEP NO. 2 Stepwise Regression Y_1:JM RATINGS 16 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CHW	.037	.022
CHA	-.182	.548
CBW1	.235	.937
CBW2	.061	.061
qNLJM	.216	.785
qLLJM	.224	.845
qCHLJM	.138	.311

8

STEP NO. 2 Stepwise Regression Y_1:JM RATINGS 16 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
qCHWJM	-.068	.075
qCHAJM	.232	.91
qCBW1JM	.24	.975

9

Stepwise regression analysis between Jap female ratings and NZ female features

Stepwise Regression Y_1:JF RATINGS 16 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	1
Variables Entered	1
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:JF RATINGS 16 X variables

(Last Step) STEP NO. 1 VARIABLE ENTERED: X_{16}: qCBW2JF

R:	R-squared:	Adj. R-squared:	Std. Error:
.877	.768	.756	.426

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	10.833	10.833	59.731
RESIDUAL	18	3.264	.181	
TOTAL	19	14.097		

2

STEP NO. 1 Stepwise Regression Y_1:JF RATINGS 16 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	8.674E-19			
qCBW2JF	1	.129	.877	59.731

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
EH	.135	.318
NL	.232	.963
LL	.213	.81
CHL	-.199	.704
CHW	.067	.076

3

Stepwise regression analysis between Jap female ratings and NZ female features

STEP NO. 1 Stepwise Regression Y_1:JF RATINGS 16 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CHA	-.174	.528
CBW1	.244	1.077
CBW2	-2.553E-19	1.108E-36
qEHJF	.271	1.352
qNLJF	.236	1.001
qLLJF	.203	.73
qCHLJF	.341	2.242

4

STEP NO. 1 Stepwise Regression Y_1:JF RATINGS 16 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
qCHWJF	-.011	.002
qCHAJF	.401	3.266
qCBW1JF	.275	1.387

5

Stepwise regression analysis between NZ male ratings and Jap female features

Stepwise Regression Y_1:NZM RATINGS 2 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	1
Variables Entered	1
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:NZM RATINGS 2 X variables

(Last Step) STEP NO. 1 VARIABLE ENTERED: X_2: qNLNZM

R:	R-squared:	Adj. R-squared:	Std. Error:
.637	.406	.373	.509

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	3.189	3.189	12.287
RESIDUAL	18	4.672	.26	
TOTAL	19	7.861		

2

STEP NO. 1 Stepwise Regression Y_1:NZM RATINGS 2 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-8.283E-17			
qNLNZM	1	.285	.637	12.287

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
NL	-2.962E-17	1.491E-32

3

Stepwise regression analysis between NZ female rating s and Jap female features

Stepwise Regression Y_1:NZF RATINGS 3 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	2
Variables Entered	2
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:NZF RATINGS 3 X variables

STEP NO. 1 VARIABLE ENTERED: X_3: qNLNZF

R:	R-squared:	Adj. R-squared:	Std. Error:
.61	.372	.337	.502

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	2.691	2.691	10.664
RESIDUAL	18	4.543	.252	
TOTAL	19	7.234		

2

STEP NO. 1 Stepwise Regression Y_1:NZF RATINGS 3 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-1.236E-16			
qNLNZF	1	.306	.61	10.664

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
NL	-3.020E-17	1.551E-32
LL	.524	6.431

3

Stepwise regression analysis between NZ female rating s and Jap female features

Stepwise Regression Y_1:NZF RATINGS 3 X variables

(Last Step) STEP NO. 2 VARIABLE ENTERED: X_2: LL

R:	R-squared:	Adj. R-squared:	Std. Error:
.738	.544	.491	.44

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	2	3.938	1.969	10.156
RESIDUAL	17	3.296	.194	
TOTAL	19	7.234		

4

STEP NO. 2 Stepwise Regression Y_1:NZF RATINGS 3 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-1.001			
LL	.016	.006	.416	6.431
qNLNZF	.962	.269	.587	12.801

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
NL	.163	.436

5

Stepwise regression analysis between Jap male ratings and Jap female features

Stepwise Regression Y_1:JM RATINGS 3 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	1
Variables Entered	1
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:JM RATINGS 3 X variables

(Last Step) STEP NO. 1 VARIABLE ENTERED: X_1: ES1

R:	R-squared:	Adj. R-squared:	Std. Error:
.499	.249	.208	.721

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	3.112	3.112	5.979
RESIDUAL	18	9.367	.52	
TOTAL	19	12.479		

2

STEP NO. 1 Stepwise Regression Y_1:JM RATINGS 3 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	13.549			
ES1	-.019	.008	-.499	5.979

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
NW2	-.294	1.604
UL	-.382	2.9

3

Stepwise regression analysis between NZ male ratings and NZ male features

Stepwise Regression Y_1:NZM RATINGS 6 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	1
Variables Entered	1
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:NZM RATINGS 6 X variables

(Last Step) STEP NO. 1 VARIABLE ENTERED: X_6: qCHANZM

R:	R-squared:	Adj. R-squared:	Std. Error:
.634	.402	.366	.507

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	2.929	2.929	11.407
RESIDUAL	17	4.365	.257	
TOTAL	18	7.293		

2

STEP NO. 1 Stepwise Regression Y_1:NZM RATINGS 6 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-1.735E-18			
qCHANZM	1	.296	.634	11.407

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CHL	.156	.399
CHW	-.055	.048
CHA	2.915E-18	1.359E-34
qCHLNZM	.186	.576
qCHWNZM	.092	.135

3

Stepwise regression analysis between NZ female ratings and NZ male features

Stepwise Regression Y_1:NZF RATINGS 7 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	1
Variables Entered	1
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:NZF RATINGS 7 X variables

(Last Step) STEP NO. 1 VARIABLE ENTERED: X_7: qCHANZF

R:	R-squared:	Adj. R-squared:	Std. Error:
.611	.373	.336	.705

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	5.022	5.022	10.116
RESIDUAL	17	8.439	.496	
TOTAL	18	13.461		

2

STEP NO. 1 Stepwise Regression Y_1:NZF RATINGS 7 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	1.301E-18			
qCHANZF	1	.314	.611	10.116

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CHL	.16	.422
CHW	.064	.066
CHA	4.588E-18	3.368E-34
EBH	.046	.034
qCHLNZF	.225	.857

3

Stepwise regression analysis between NZ female ratings and NZ male features

STEP NO. 1 Stepwise Regression Y_1:NZF RATINGS 7 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
qCHWNZF	.309	1.687

4

Stepwise regression analysis between NZ female ratings and Jap male features

Stepwise Regression Y_1:NZF RATINGS 2 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	1
Variables Entered	1
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:NZF RATINGS 2 X variables

(Last Step) STEP NO. 1 VARIABLE ENTERED: X_2: qEHNZF

R:	R-squared:	Adj. R-squared:	Std. Error:
.586	.343	.307	.473

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	2.099	2.099	9.4
RESIDUAL	18	4.02	.223	
TOTAL	19	6.119		

2

STEP NO. 1 Stepwise Regression Y_1:NZF RATINGS 2 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-1.821E-17			
qEHNZF	1	.326	.586	9.4

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
EH	-4.896E-18	4.075E-34

3

Stepwise regression analysis between Jap female ratings and Jap male features

Stepwise Regression Y_1:JF RATINGS 4 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	2
Variables Entered	2
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:JF RATINGS 4 X variables

STEP NO. 1 VARIABLE ENTERED: X_3: qES2JF

R:	R-squared:	Adj. R-squared:	Std. Error:
.576	.332	.294	.687

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	4.216	4.216	8.927
RESIDUAL	18	8.502	.472	
TOTAL	19	12.718		

2

STEP NO. 1 Stepwise Regression Y_1:JF RATINGS 4 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	7.980E-17			
qES2JF	1	.335	.576	8.927

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
NW2	-.423	3.699
CBW1	.54	6.988
qCBW1JF	.566	8.001

3

Stepwise regression analysis between Jap female ratings and Jap male features

Stepwise Regression Y_1:JF RATINGS 4 X variables

(Last Step) STEP NO. 2 VARIABLE ENTERED: X_4: qCBW1JF

R:	R-squared:	Adj. R-squared:	Std. Error:
.739	.545	.492	.583

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	2	6.937	3.468	10.2
RESIDUAL	17	5.781	.34	
TOTAL	19	12.718		

4

STEP NO. 2 Stepwise Regression Y_1:JF RATINGS 4 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-2.804			
qES2JF	.855	.289	.493	8.788
qCBW1JF	.843	.298	.47	8.001

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
NW2	-.182	.548
CBW1	-.129	.273

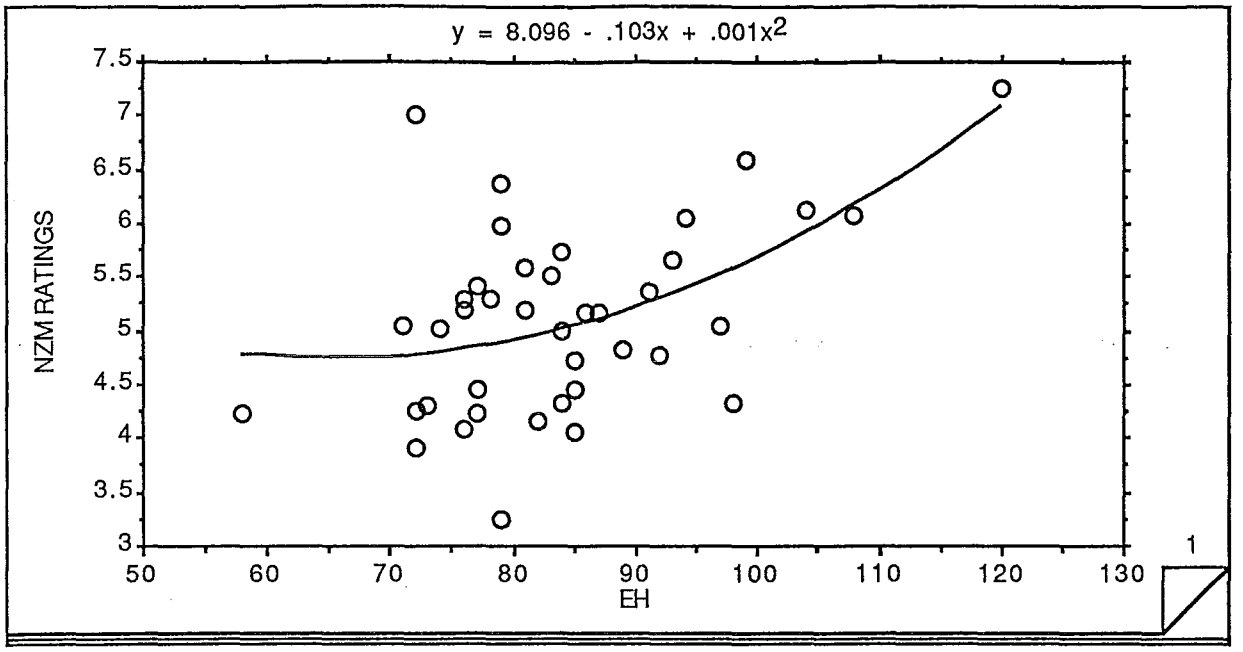
5

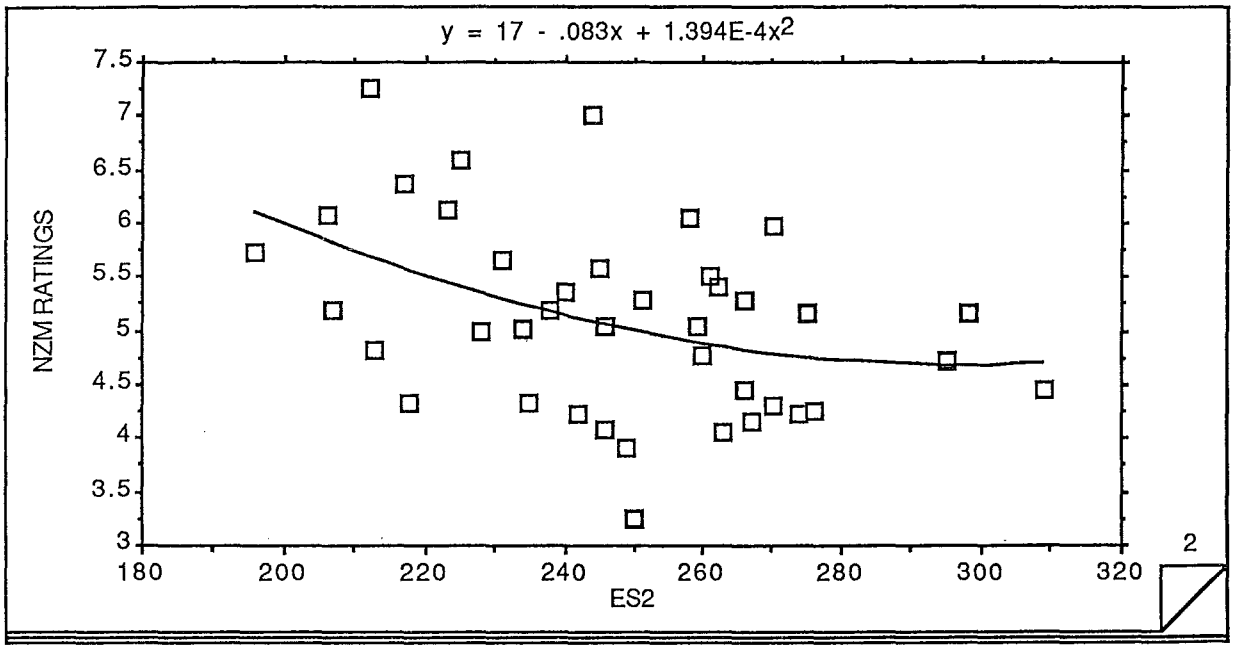
Appendix F

- Scattergrams of significant curvilinear correlations between attractiveness ratings and feature measurements of the combined female and male faces.

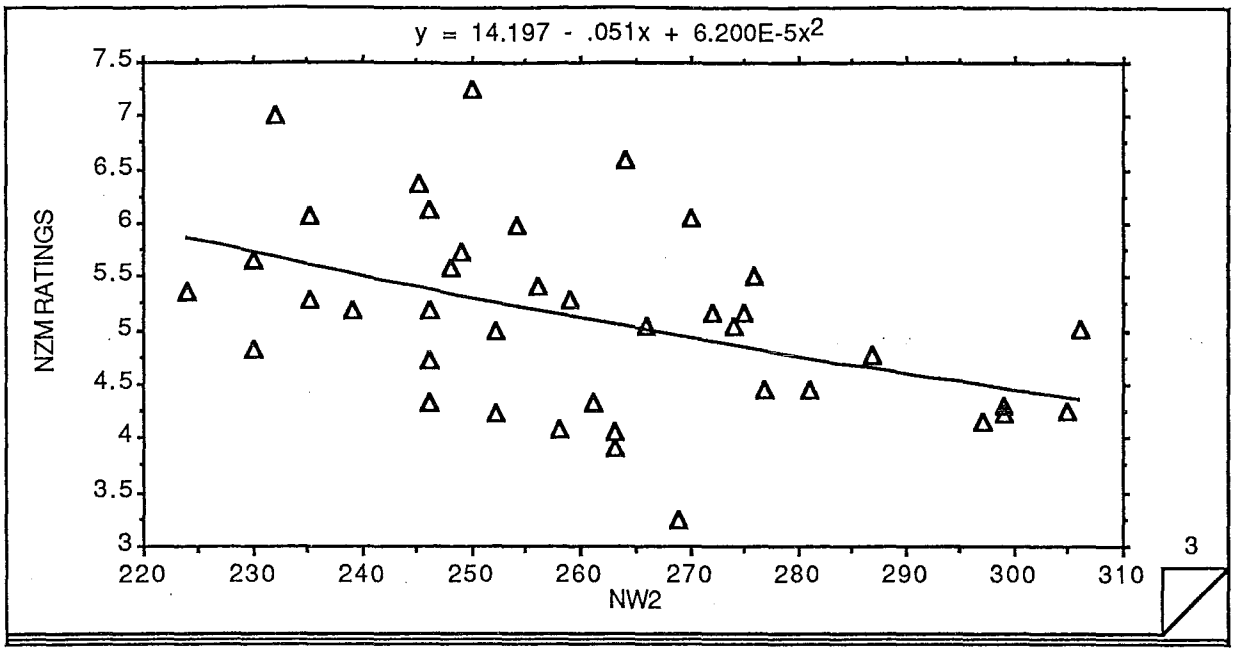
Please note that where significant curvilinear correlations were found for both genders from one culture for a particular feature measurement, only the scattergram for one of these genders is given since the correlations were almost identical.

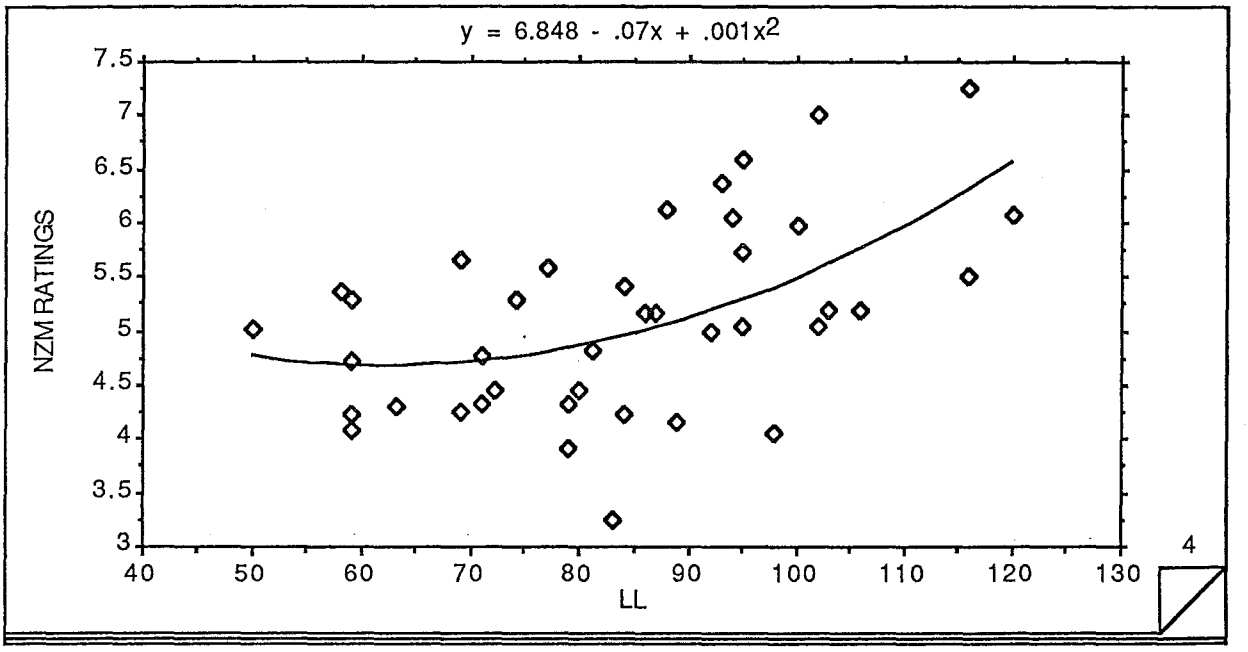
Curvilinear correlations between NZ male ratings and All female features



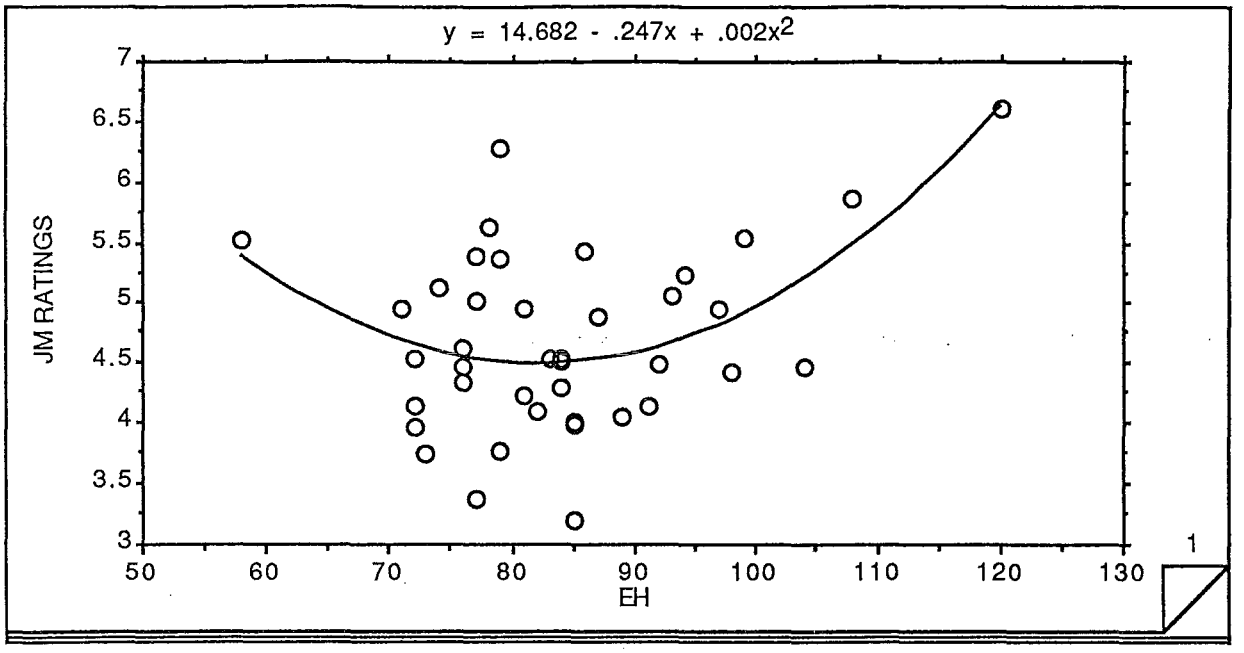


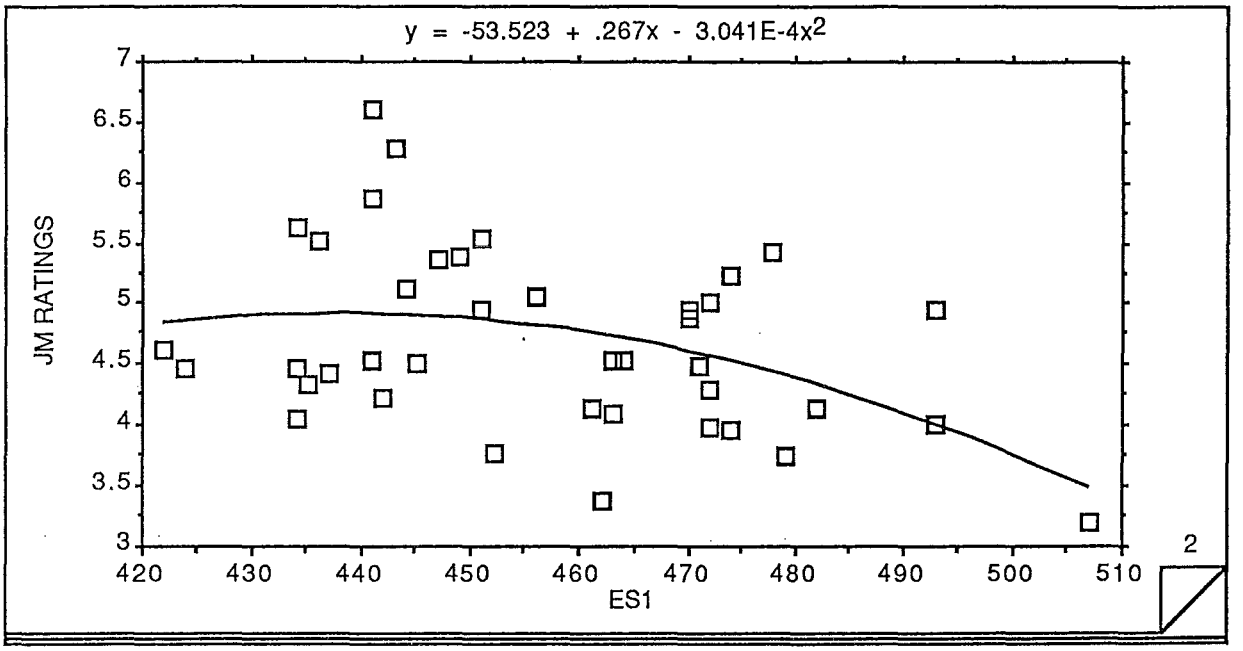
Curvilinear correlations between NZ male ratings and All female features



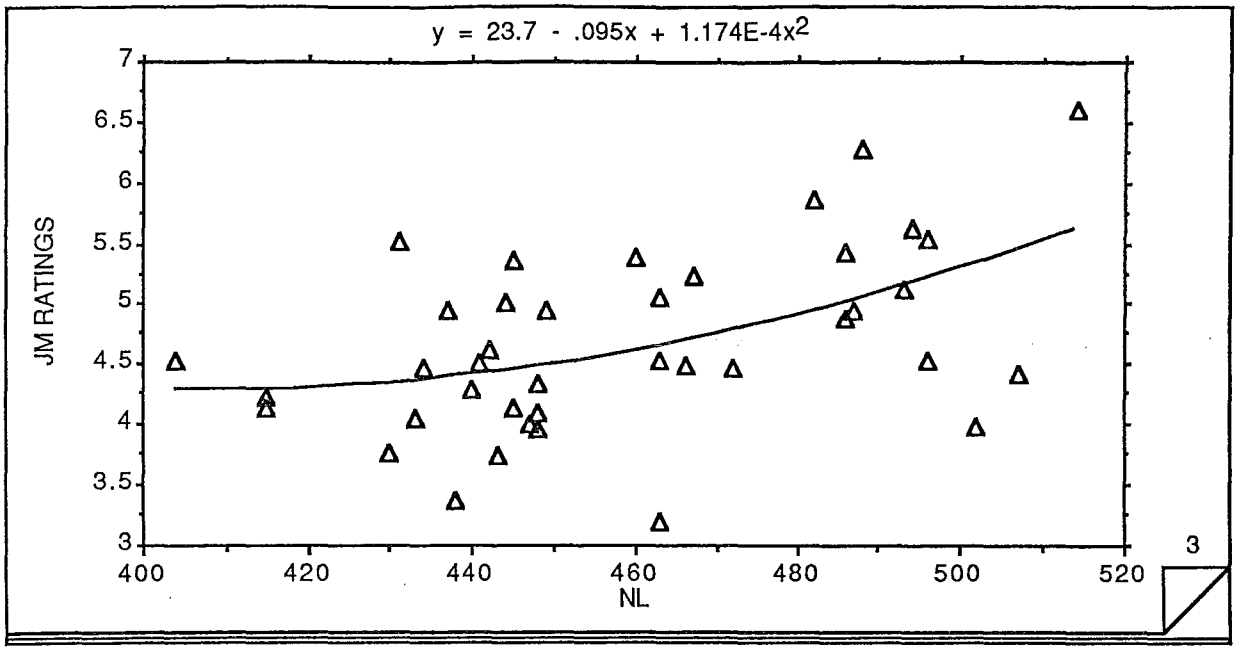


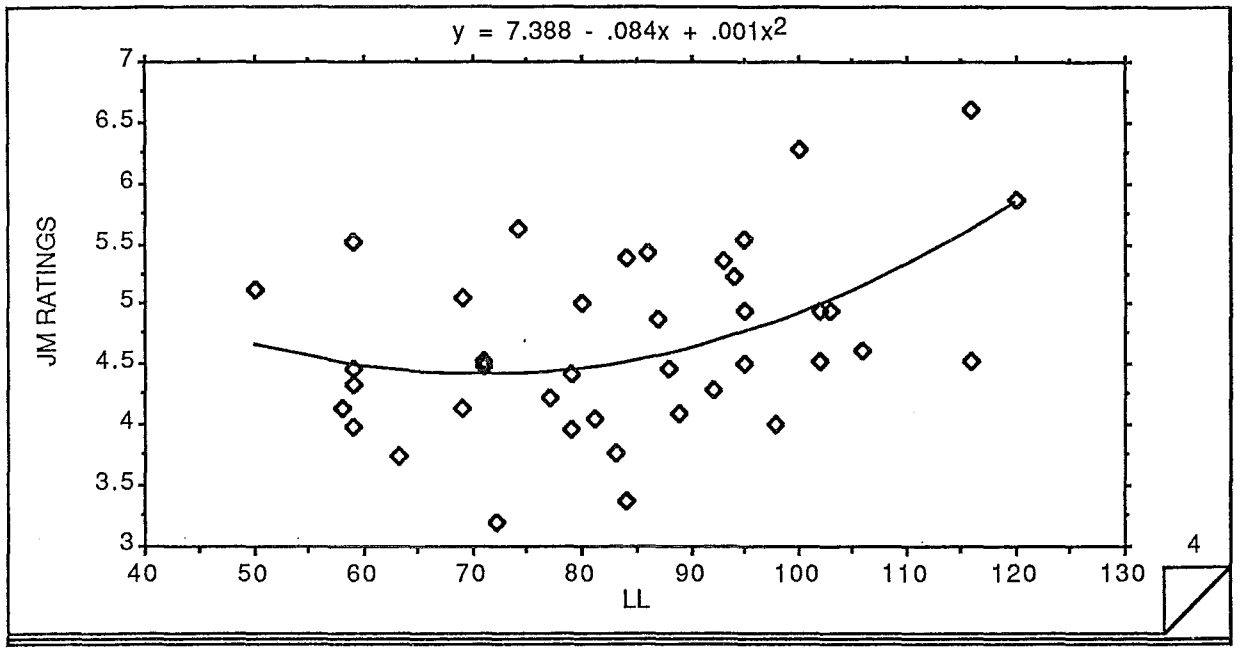
Curvilinear correlations between Jap male ratings and All female features



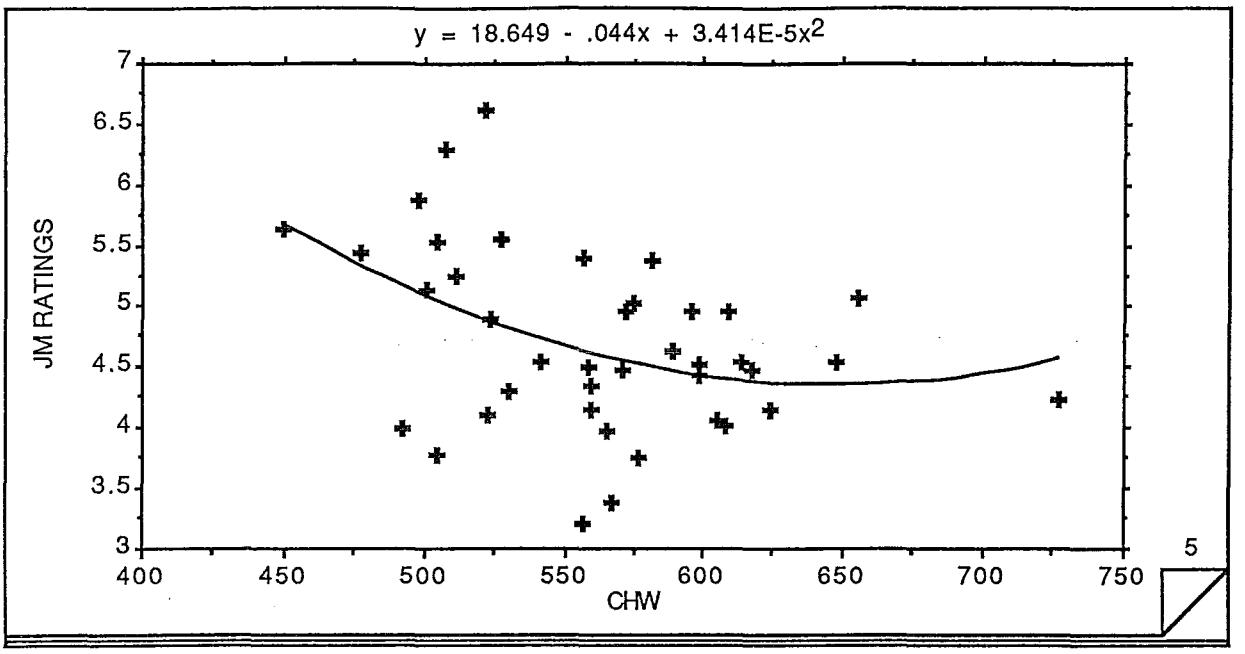


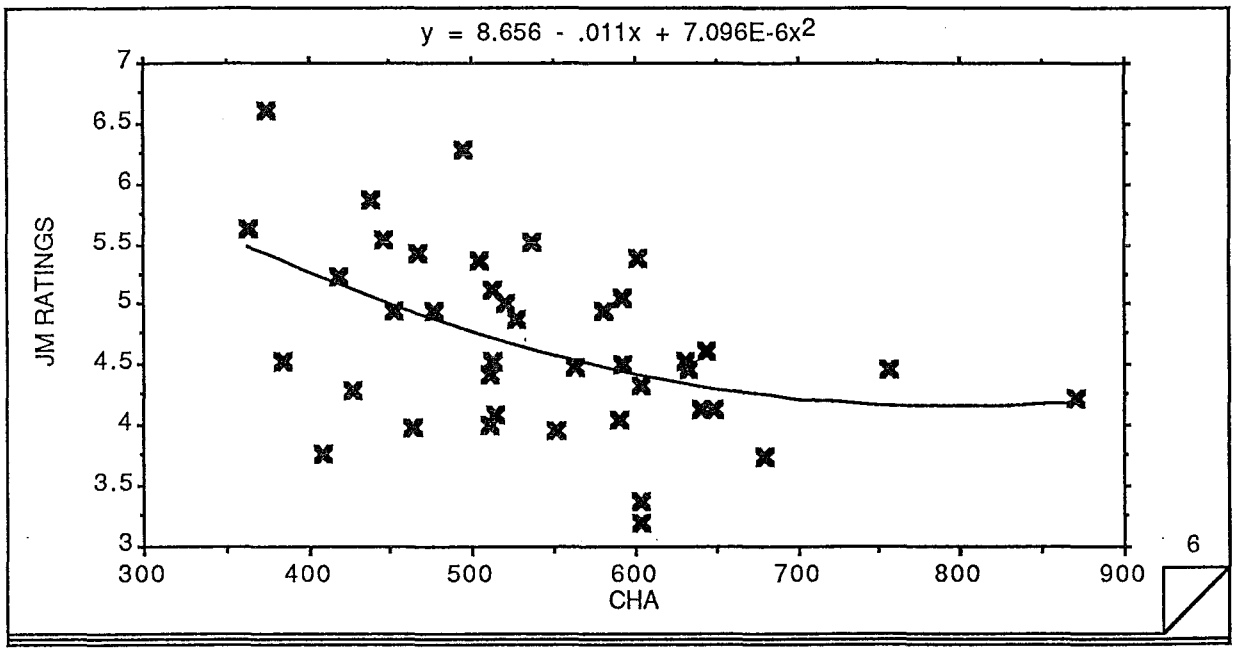
Curvilinear correlations between Jap male ratings and All female features



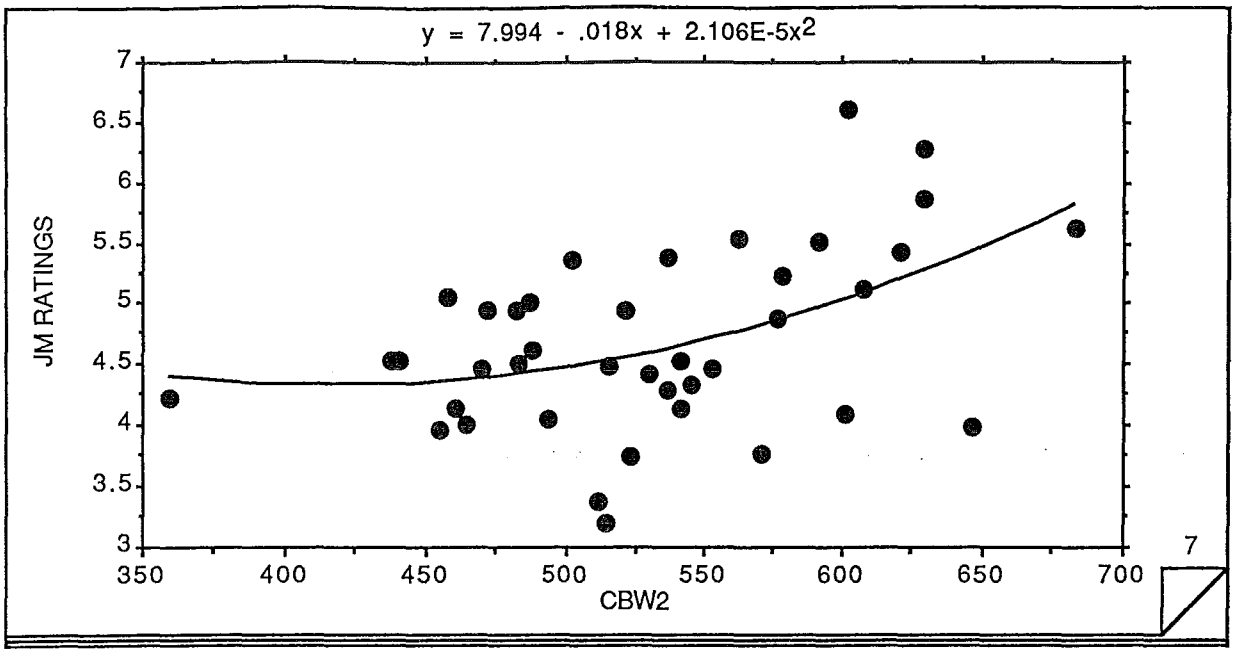


Curvilinear correlations between Jap male ratings and All female features

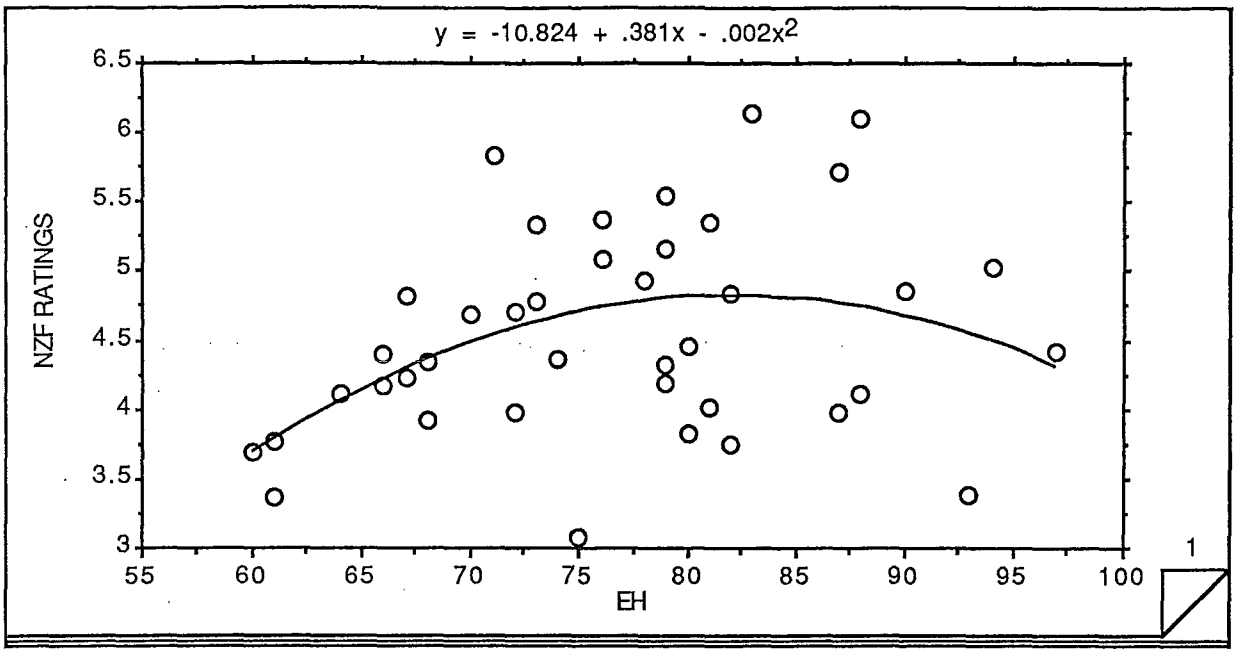


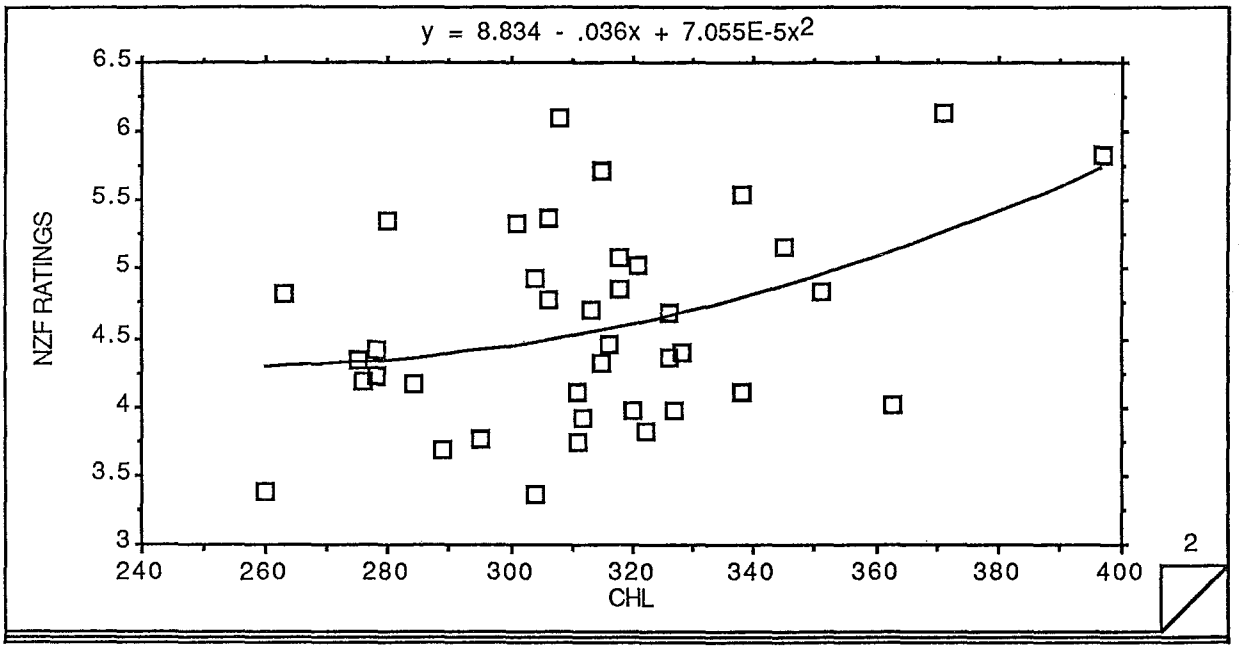


Curvilinear correlations between Jap male ratings and All female features

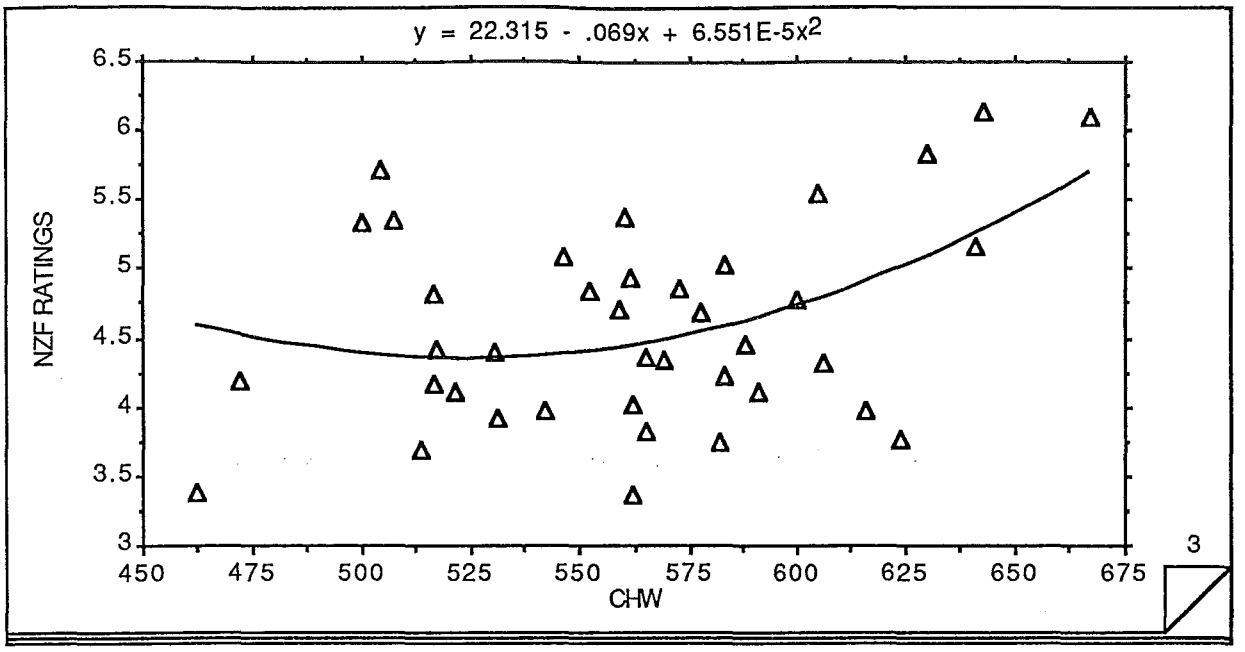


Curvilinear correlations between NZ female ratings and All male features

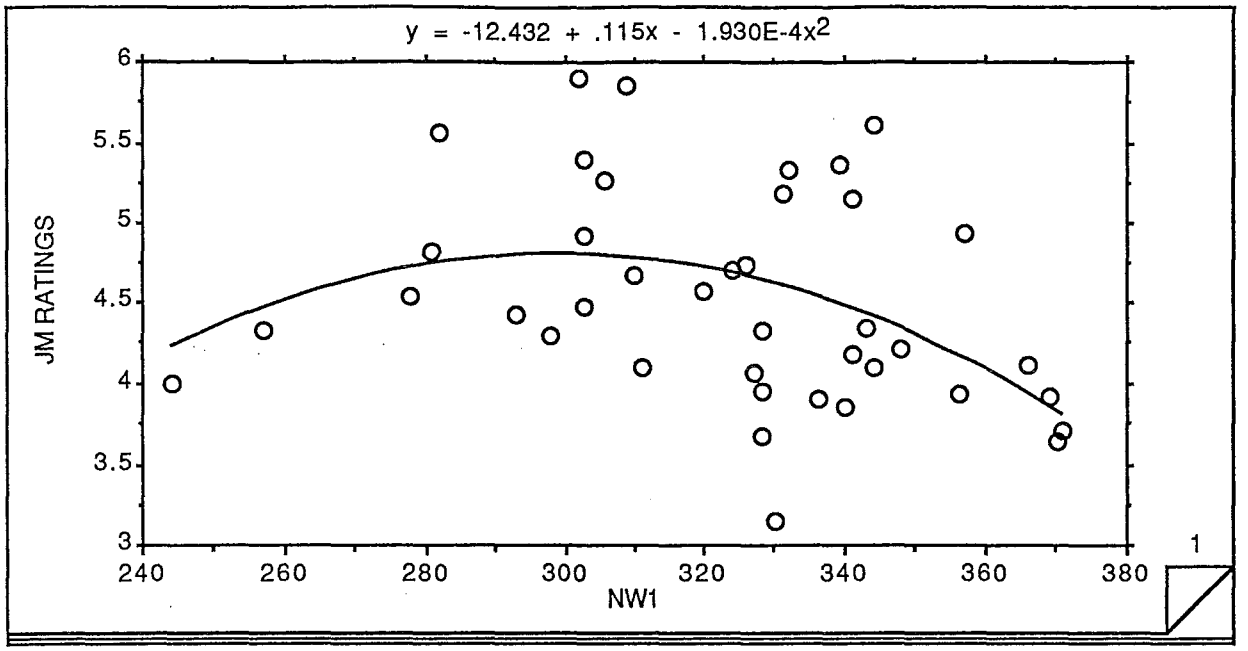


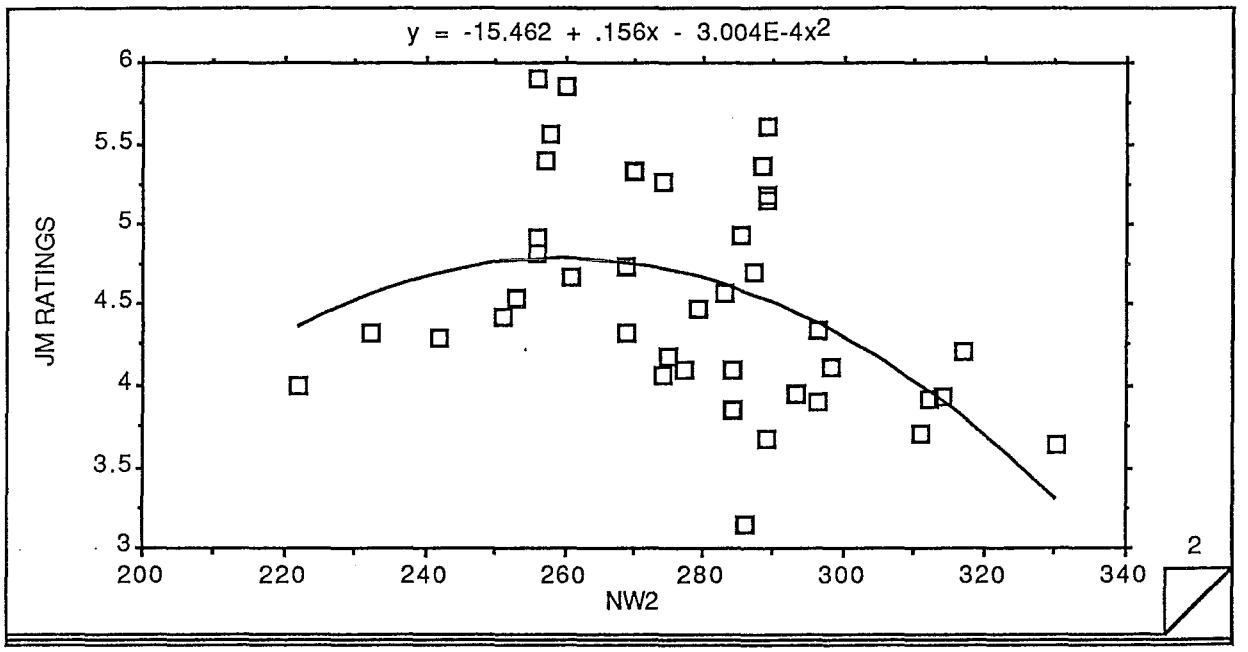


Curvilinear correlations between NZ female ratings and All male features



Curvilinear correlations between Jap male ratings and All male features





Appendix G

- Calculations of regression analyses for the combined female and male faces, using the variables which were significantly correlated with attractiveness ratings.

Stepwise regression analysis between NZ male ratings and All female features

Stepwise Regression Y_1:NZM RATINGS 11 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	2
Variables Entered	2
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:NZM RATINGS 11 X variables

STEP NO. 1 VARIABLE ENTERED: X_{11}: qLLNZM

R:	R-squared:	Adj. R-squared:	Std. Error:
.543	.295	.276	.752

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	8.994	8.994	15.885
RESIDUAL	38	21.516	.566	
TOTAL	39	30.51		

2

STEP NO. 1 Stepwise Regression Y_1:NZM RATINGS 11 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	9.975E-18			
qLLNZM	1	.251	.543	15.885

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
EH	.315	4.083
ES2	-.246	2.389
NW1	-.336	4.707
NW2	-.406	7.285
NA	-.241	2.276

3

Stepwise regression analysis between NZ male ratings and All female features

STEP NO. 1 Stepwise Regression Y_1:NZM RATINGS 11 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
UL	-.375	6.054
LL	-1.268E-18	5.949E-35
qEHNZM	.33	4.532
qES2NZM	.258	2.64
qNW2NZM	.415	7.693

4

Stepwise Regression Y_1:NZM RATINGS 11 X variables

(Last Step) STEP NO. 2 VARIABLE ENTERED: X_{10}: qNW2NZM

R:	R-squared:	Adj. R-squared:	Std. Error:
.645	.416	.385	.694

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	2	12.698	6.349	13.188
RESIDUAL	37	17.812	.481	
TOTAL	39	30.51		

5

STEP NO. 2 Stepwise Regression Y_1:NZM RATINGS 11 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-3.44			
qNW2NZM	.797	.287	.355	7.693
qLLNZM	.876	.236	.476	13.82

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
EH	.265	2.726
ES2	-.038	.051
NW1	.091	.298
NW2	.105	.401

6

Stepwise regression analysis between NZ male ratings and All female features

STEP NO. 2 Stepwise Regression Y_1:NZM RATINGS 11 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
NA	.137	.686
UL	-.232	2.05
LL	.001	4.142E-5
qEHNZM	.286	3.199
qES2NZM	.05	.09

7

Stepwise regression analysis between NZ female ratings and All female features

Stepwise Regression Y_1:NZF RATINGS 4 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	1
Variables Entered	1
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:NZF RATINGS 4 X variables

(Last Step) STEP NO. 1 VARIABLE ENTERED: X_4: qLLNZF

R:	R-squared:	Adj. R-squared:	Std. Error:
.586	.343	.326	.642

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	8.199	8.199	19.874
RESIDUAL	38	15.676	.413	
TOTAL	39	23.875		

2

STEP NO. 1 Stepwise Regression Y_1:NZF RATINGS 4 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	8.674E-19			
qLLNZF	1	.224	.586	19.874

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
EH	.13	.64
LL	-4.123E-18	6.289E-34
qEHNZF	.203	1.585

3

Stepwise regression analysis between Jap male ratings and All female features

Stepwise Regression Y_1:JM RATINGS 15 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	4
Variables Entered	4
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:JM RATINGS 15 X variables

STEP NO. 1 VARIABLE ENTERED: X_9: qEHJM

R:	R-squared:	Adj. R-squared:	Std. Error:
.522	.273	.254	.644

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	5.904	5.904	14.248
RESIDUAL	38	15.745	.414	
TOTAL	39	21.649		

2

STEP NO. 1 Stepwise Regression Y_1:JM RATINGS 15 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-4.163E-17			
qEHJM	1	.265	.522	14.248

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
ES1	-.286	3.291
ES2	-.144	.78
NL	.4	7.045
LL	.27	2.904
CHW	-.331	4.542

3

Stepwise regression analysis between Jap male ratings and All female features

STEP NO. 1 Stepwise Regression Y_1:JM RATINGS 15 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CHA	-.375	6.071
CBW1	.36	5.517
CBW2	.389	6.582
qES1JM	.365	5.7
qNLJM	.376	6.1
qLLJM	.278	3.092
qCHWJM	.41	7.459

4

STEP NO. 1 Stepwise Regression Y_1:JM RATINGS 15 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
qCHAJM	.39	6.656
qCBW2JM	.438	8.788

5

Stepwise Regression Y_1:JM RATINGS 15 X variables

STEP NO. 2 VARIABLE ENTERED: X_{15}: qCBW2JM

R:	R-squared:	Adj. R-squared:	Std. Error:
.642	.412	.381	.586

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	2	8.925	4.463	12.978
RESIDUAL	37	12.723	.344	
TOTAL	39	21.649		

6

Stepwise regression analysis between Jap male ratings and All female features

STEP NO. 2 Stepwise Regression Y_1:JM RATINGS 15 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-3.133			
qEHJM	.856	.246	.447	12.094
qCBW2JM	.812	.274	.381	8.788

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
ES1	-.251	2.425
ES2	-.336	4.573
NL	.214	1.723
LL	.348	4.964

7

STEP NO. 2 Stepwise Regression Y_1:JM RATINGS 15 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CHW	.069	.171
CHA	-.2	1.501
CBW1	-.063	.143
CBW2	-.051	.096
qES1JM	.337	4.607
qNLJM	.184	1.261
qLLJM	.277	2.992

8

STEP NO. 2 Stepwise Regression Y_1:JM RATINGS 15 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
qCHWJM	-.015	.008
qCHAJM	.191	1.366

9

Stepwise regression analysis between Jap male ratings and All female features

Stepwise Regression Y_1:JM RATINGS 15 X variables

STEP NO. 3 VARIABLE ENTERED: X_4: LL

R:	R-squared:	Adj. R-squared:	Std. Error:
.695	.484	.44	.557

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	3	10.467	3.489	11.233
RESIDUAL	36	11.182	.311	
TOTAL	39	21.649		

10

STEP NO. 3 Stepwise Regression Y_1:JM RATINGS 15 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-3.579			
LL	.012	.005	.282	4.964
qEHJM	.68	.247	.355	7.592
qCBW2JM	.868	.262	.407	11.003

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
ES1	-.277	2.903
ES2	-.287	3.137
NL	.22	1.777

11

STEP NO. 3 Stepwise Regression Y_1:JM RATINGS 15 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CHW	.112	.445
CHA	-.04	.056
CBW1	.033	.038
CBW2	-.069	.165
qES1JM	.359	5.164
qNLJM	.201	1.471
qLLJM	-.007	.002

12

Stepwise regression analysis between Jap male ratings and All female features

STEP NO. 3 Stepwise Regression Y_1:JM RATINGS 15 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
qCHWJM	-.035	.044
qCHAJM	.004	.001

13

Stepwise Regression Y_1:JM RATINGS 15 X variables

(Last Step) STEP NO. 4 VARIABLE ENTERED: X_{10}: qES1JM

R:	R-squared:	Adj. R-squared:	Std. Error:
.742	.55	.498	.528

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	4	11.905	2.976	10.691
RESIDUAL	35	9.744	.278	
TOTAL	39	21.649		

14

STEP NO. 4 Stepwise Regression Y_1:JM RATINGS 15 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-5.802			
LL	.012	.005	.281	5.518
qEHJM	.593	.237	.309	6.255
qES1JM	.648	.285	.266	5.164
qCBW2JM	.782	.25	.367	9.749

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
ES1	.088	.263
ES2	-.081	.224

15

Stepwise regression analysis between Jap male ratings and All female features

STEP NO. 4 Stepwise Regression Y_1:JM RATINGS 15 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
NL	.321	3.915
CHW	.016	.009
CHA	-.106	.386
CBW1	.042	.061
CBW2	-.019	.012
qNLJM	.272	2.713
qLLJM	-.042	.059

16

STEP NO. 4 Stepwise Regression Y_1:JM RATINGS 15 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
qCHWJM	.021	.015
qCHAJM	.04	.055

17

Stepwise regression analysis between Jap female ratings and All female features

Stepwise Regression Y_1:JF RATINGS 15 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	3
Variables Entered	3
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:JF RATINGS 15 X variables

STEP NO. 1 VARIABLE ENTERED: X_{10}: qEHJF

R:	R-squared:	Adj. R-squared:	Std. Error:
.566	.321	.303	.692

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	8.584	8.584	17.928
RESIDUAL	38	18.195	.479	
TOTAL	39	26.779		

2

STEP NO. 1 Stepwise Regression Y_1:JF RATINGS 15 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-1.995E-17			
qEHJF	1	.236	.566	17.928

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
EH	-3.751E-18	5.205E-34
ES2	-.127	.605
NL	.357	5.393
LL	.305	3.79
CHW	-.36	5.493

3

Stepwise regression analysis between Jap female ratings and All female features

STEP NO. 1 Stepwise Regression Y_1:JF RATINGS 15 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CHA	-.362	5.593
CBW1	.313	4.007
CBW2	.38	6.23
MW	.204	1.607
qNLJF	.333	4.627
qLLJF	.345	5.008
qCHWJF	.404	7.206

4

STEP NO. 1 Stepwise Regression Y_1:JF RATINGS 15 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
qCHAJF	.389	6.595
qCBW2JF	.392	6.71

5

Stepwise Regression Y_1:JF RATINGS 15 X variables

STEP NO. 2 VARIABLE ENTERED: X_{13}: qCHWJF

R:	R-squared:	Adj. R-squared:	Std. Error:
.657	.431	.401	.642

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	2	11.55	5.775	14.031
RESIDUAL	37	15.229	.412	
TOTAL	39	26.779		

6

Stepwise regression analysis between Jap female ratings and All female features

STEP NO. 2 Stepwise Regression Y_1:JF RATINGS 15 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-3.482			
qEHJF	.929	.221	.526	17.744
qCHWJF	.842	.314	.335	7.206

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
EH	.052	.097
ES2	-.315	3.967
NL	.199	1.491
LL	.362	5.414

7

STEP NO. 2 Stepwise Regression Y_1:JF RATINGS 15 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CHW	.036	.047
CHA	-.159	.931
CBW1	-.06	.132
CBW2	.03	.033
MW	.292	3.356
qNLJF	.174	1.13
qLLJF	.351	5.047

8

STEP NO. 2 Stepwise Regression Y_1:JF RATINGS 15 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
qCHAJF	.173	1.117
qCBW2JF	.035	.045

9

Stepwise regression analysis between Jap female ratings and All female features

Stepwise Regression Y_1:JF RATINGS 15 X variables

(Last Step) STEP NO. 3 VARIABLE ENTERED: X_4: LL

R:	R-squared:	Adj. R-squared:	Std. Error:
.711	.506	.464	.606

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	3	13.541	4.514	12.275
RESIDUAL	36	13.238	.368	
TOTAL	39	26.779		

10

STEP NO. 3 Stepwise Regression Y_1:JF RATINGS 15 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-3.985			
LL	.014	.006	.293	5.414
qEHJF	.739	.224	.418	10.879
qCHWJF	.885	.297	.352	8.882

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
EH	-.04	.055
ES2	-.269	2.722
NL	.236	2.073

11

STEP NO. 3 Stepwise Regression Y_1:JF RATINGS 15 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CHW	.074	.193
CHA	.022	.017
CBW1	.06	.125
CBW2	.058	.117
MW	.209	1.599
qNLJF	.22	1.775
qLLJF	.114	.463

12

Stepwise regression analysis between Jap female ratings and All female features

STEP NO. 3 Stepwise Regression Y_1:JF RATINGS 15 X variables

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
qCHAJF	-.033	.039
qCBW2JF	.081	.23

13

Stepwise regression analysis between NZ male ratings and All male features

Stepwise Regression Y_1:NZM RATINGS 4 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	2
Variables Entered	2
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:NZM RATINGS 4 X variables

STEP NO. 1 VARIABLE ENTERED: X_4: qCHWNZM

R:	R-squared:	Adj. R-squared:	Std. Error:
.458	.209	.188	.468

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	2.143	2.143	9.802
RESIDUAL	37	8.089	.219	
TOTAL	38	10.232		

2

STEP NO. 1 Stepwise Regression Y_1:NZM RATINGS 4 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-1.826E-16			
qCHWNZM	1	.319	.458	9.802

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CHL	.324	4.219
CHW	-4.192E-17	6.327E-32
qCHLNZM	.34	4.713

3

Stepwise regression analysis between NZ male ratings and All male features

Stepwise Regression Y_1:NZM RATINGS 4 X variables

(Last Step) STEP NO. 2 VARIABLE ENTERED: X_3: qCHLNZM

R:	R-squared:	Adj. R-squared:	Std. Error:
.549	.301	.262	.446

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	2	3.079	1.54	7.749
RESIDUAL	36	7.153	.199	
TOTAL	38	10.232		

4

STEP NO. 2 Stepwise Regression Y_1:NZM RATINGS 4 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-1.98			
qCHLNZM	.721	.332	.327	4.713
qCHWNZM	.73	.329	.334	4.933

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CHL	.014	.006
CHW	-.107	.406

5

Stepwise regression analysis between NZ female ratings and All male features

Stepwise Regression Y_1:NZF RATINGS 6 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	2
Variables Entered	2
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:NZF RATINGS 6 X variables

STEP NO. 1 VARIABLE ENTERED: X_4: qEHNZF

R:	R-squared:	Adj. R-squared:	Std. Error:
.463	.214	.193	.65

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	4.254	4.254	10.068
RESIDUAL	37	15.633	.423	
TOTAL	38	19.887		

2

STEP NO. 1 Stepwise Regression Y_1:NZF RATINGS 6 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-.267			
qEHNZF	1.068	.337	.463	10.068

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CHL	.275	2.938
CHW	.283	3.137
CBW3	.265	2.715
qCHLNZF	.321	4.122
qCHWNZF	.374	5.854

3

Stepwise regression analysis between NZ female ratings and All male features

Stepwise Regression Y_1:NZF RATINGS 6 X variables

(Last Step) STEP NO. 2 VARIABLE ENTERED: X_6: qCHWNZF

R:	R-squared:	Adj. R-squared:	Std. Error:
.569	.324	.286	.611

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	2	6.441	3.22	8.622
RESIDUAL	36	13.446	.374	
TOTAL	38	19.887		

4

STEP NO. 2 Stepwise Regression Y_1:NZF RATINGS 6 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-3.154			
qEHNZF	.896	.324	.388	7.625
qCHWNZF	.8	.331	.34	5.854

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CHL	.183	1.216
CHW	-.024	.021
CBW3	.154	.846
qCHLNZF	.222	1.807

5

Stepwise regression analysis between Jap male ratings and All male features

Stepwise Regression Y_1:JM RATINGS 3 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	1
Variables Entered	1
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:JM RATINGS 3 X variables

(Last Step) STEP NO. 1 VARIABLE ENTERED: X_3: qNW2JM

R:	R-squared:	Adj. R-squared:	Std. Error:
.488	.238	.218	.588

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	4.102	4.102	11.875
RESIDUAL	38	13.127	.345	
TOTAL	39	17.229		

2

STEP NO. 1 Stepwise Regression Y_1:JM RATINGS 3 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-1.041E-17			
qNW2JM	1	.29	.488	11.875

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
NW2	4.987E-19	9.203E-36
qNW1JM	.078	.226

3

Stepwise regression analysis between Jap female ratings and All male features

Stepwise Regression Y_1:JF RATINGS 2 X variables

Summary Information

F to Enter	4
F to Remove	3.996
Number of Steps	1
Variables Entered	1
Variables Forced	0...0

No Residual Statistics Computed

1

Stepwise Regression Y_1:JF RATINGS 2 X variables

(Last Step) STEP NO. 1 VARIABLE ENTERED: X_2: qNW2JF

R:	R-squared:	Adj. R-squared:	Std. Error:
.435	.189	.168	.708

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	4.442	4.442	8.861
RESIDUAL	38	19.048	.501	
TOTAL	39	23.49		

2

STEP NO. 1 Stepwise Regression Y_1:JF RATINGS 2 X variables

Variables in Equation

Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-1.908E-17			
qNW2JF	1	.336	.435	8.861

Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
CBW1	.221	1.907

3